THE GENERATION OF CERTAIN TIME EXPRESSIONS IN ENGLISH

by

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ABSTRACT

In this study a set of rules that generate certain time expressions in English is constructed. The methodology used is mainly that outlined by Noam Chomsky in *Aspects of the Theory of Syntax* (1965).

The discussion is confined to those time expressions that are single words, single phrases, or sequences of phrases in surface structure. These have the basic deep structure Prep + Det + N (S'), where N has the syntactic feature [+ Time]. Surface structure single word time expressions are derived from this deep structure by deleting Prep and rewriting the NP as a single lexical item; surface structure sequences of phrases are derived by applying the relative clause transformation to the embedded S.

Chomsky's list of syntactic features for nouns is extended by adding some inherent features and some selectional features. The additions are needed to distinguish nouns that can occur in time expressions from those that cannot, to state the collocation restrictions between some prepositions and determiners and the time nouns, and to state certain ordering restrictions on surface structure sequences of phrases.

The time expressions considered are subcategorized into Locative Time and Duration Time on the basis of collocation with some subclasses of Verb. These subcategories
are formally distinct in that their prepositions are mutually exclusive. Locative Time expressions are further subcategorized into Dynamic Time expressions, those whose collocation restrictions with Auxiliary expansions are linguistically determinable, and Static Time expressions, those whose collocation restrictions are not linguistically determinable. These two subcategories are, again, formally distinct, for their determiners are mutually exclusive.
TABLE OF CONTENTS

CHAPTER I
INTRODUCTION 1

CHAPTER II
THE GENERATION OF STATIC TIME EXPRESSIONS 31

CHAPTER III
THE GENERATION OF DYNAMIC TIME EXPRESSIONS 71

CHAPTER IV
THE GENERATION OF DURATION TIME EXPRESSIONS 95

CHAPTER V
CONCLUSION 122

BIBLIOGRAPHY 136

APPENDIX
SUMMARY OF TP RULES 148
CHAPTER I

INTRODUCTION

The aim of this study is to construct a fragment of a transformational generative grammar (TG) that will generate certain English time expressions. There are three major reasons for this choice. First, adverbial expressions, and particularly time expressions, have so far received very limited attention from TG grammarians. Consequently, the model proposed in this study should expand the present transformational grammars. Second, this investigation provides a further test of the validity and power of some of the assumptions and methods of TG. Third, and most important, this study should provide some further insights into the structure and behavior of English time expressions.

As is implied in the statement of the aim, the scope of this study is limited in two ways. The aim is to construct not a complete grammar of English, but rather a grammar of the time constituent of sentences. In other words, the model will generate time expressions only. This limitation has been imposed because there are already a number of fairly complete general models for generating sentences and because the number of problems that would be raised in constructing a complete grammar is too great for an investigation of this length. In other words, this
study, rather than being a broad coverage, is a relatively intensive treatment of a fairly narrow problem. Although the larger model is always kept in mind, actual references are made to it only when necessary.

The second limitation is in the types of time expressions that are discussed. This limitation will be defined later in this chapter, and elsewhere as the need arises.

Since the focus is on the time constituent, this constituent and its place in the larger model must now be defined. The first question that must be answered is whether it is more revealing to consider time expressions as a separate class or as a subclass of a larger class, Adverb. In his model in "A Transformational Approach to Syntax" (1958) Chomsky treats time expressions as one subclass of Adverb, the other being place expressions:²

\[
\begin{align*}
(5) \text{Adv} & \rightarrow \{ \text{at 3 o'clock, in the morning, etc.} \\
& \hspace{1cm} \text{yesterday, every morning, etc.} \\
& \hspace{1cm} \text{Adv}_1 \}
\end{align*}
\]

\[
(6) \text{Adv}_1 \rightarrow \{ \text{in the house, at the theatre, etc.} \\
& \hspace{1cm} \text{there, away, home, ...} \}
\]

Lees in The Grammar of English Nominalizations (1963) separates time and place expressions:³

\[
(3) \text{MV} \rightarrow \{ \text{be + Pr} \\
& \hspace{1cm} \text{Vb} \} \ \text{(Loc)} \ \text{(Tm)}
\]
However, in his discussion he does group time and place with manner and other adverbial expressions. This suggests that we must distinguish between expansion rules and subcategorization rules and between subcategorization that is specified in the system of phrase structure rules and subcategorization that is not specified in this way. A certain parallelism between locative (synonymous with "place") and time expressions is implied in Lees' rewrite rules for the categories Loc and Tm:

$$\text{(17) Loc } \rightarrow \{ \begin{array}{c}
\text{here, there, ... } \\
\text{in (side (of)) Nom }\\
\text{P_{Loc} + Nom } \\
\text{... }
\end{array} \}$$

$$\text{(19) Tm } \rightarrow \{ \begin{array}{c}
\text{yesterday, now, ... } \\
\text{P_{Tm} + Nom_{Tm} }\\
\text{... }
\end{array} \}$$

Although Katz and Postal in *An Integrated Theory of Linguistic Descriptions* (1964) do not present a system of rules, they do make the point that adverbials in English have a general form, Preposition + Noun Phrase. Then, within this larger class of adverbial they distinguish time, place, manner, and other adverbial subclasses.

Klima in "Negation in English" (1964) also distinguishes between time and place expressions:

2. Predicate $\rightarrow$ Aux -- MV (Place) (Time)
Other types of adverbial expressions, such as frequency, are introduced in his first rewrite rule:

\[ S \rightarrow (wh) (neg) (Adv (neg)) (Adv) Nominal \rightarrow Predicate \]

In other words, his model does not group time and place with other adverbs.

Owen Thomas in *Transformational Grammar and the Teacher of English* (1965) distinguishes five subcategories of the category Adverb:

(1) sentence adverbials
(2) preverbs
(3) adverbs of location and time
(4) adverbs of manner
(5) adverbs like 'very', 'quite', and 'extremely' which can precede adjectives and certain kinds of adverbs.

Locative (place) adverbs are then distinguished from time adverbs in that the PRO form underlying time is \( \{at\} \) SOME TIME, and the PRO form underlying locative is \( \{in\} \) SOME PLACE.

In *Aspects of the Theory of Syntax* (1965) Chomsky also separates time from place in his phrase structure rules. His rule (52ii) is essentially the same as Klima's rule (2):

\[ (52ii) \text{Predicate-Phrase} \rightarrow Aux \text{VP (Place) (Time)} \]

His approach is also like Klima's in that he separates time and place from other adverbials such as direction, duration,
Uriel Weinreich in "Explorations in Semantic Theory" (1966) introduces the class "phrases of Circumstance" to deal with what are traditionally considered adverbs. These phrases of Circumstance:

... are cross-classified as to syntactic function and as to internal constituency. According to function, there are circumstances of Place, of Time, of Manner, of Purpose, of Accompaniment, of Duration, of Frequency, of Purpose, etc. According to internal constituency, there are circumstances which consist of adverbs, of prepositions and nouns, and of conjunctions and sentences.

Thus, Weinreich considers time to be a subclass of a larger class, the class of phrases of Circumstance.

In summary, time has been treated as a separate constituent in a number of TG models, even when the expressions that are termed time expressions are members of a larger class. This study, therefore, deals with a subclass of adverbial expressions.

The other question that must now be decided is where the time constituent should be introduced into the phrase structure rules. The main alternatives are to have time dominated by S, by VP, or by Predicate.

In the Third Texas Conference model Chomsky places the time constituent under the domination of S:

1. Sentence $\rightarrow$ NP + VP (Adv)
Lees, however, places time under the domination of MV, which is in turn dominated by VP:\footnote{14}

\[\begin{align*}
(1) & \text{ } S \rightarrow \text{Nom} + \text{VP} \\
(2) & \text{ } \text{VP} \rightarrow (\text{Prev}) \text{Aux} + \text{MV} \\
(3) & \text{ } \text{MV} \rightarrow \{\text{be} + \text{Pr}\} (\text{Loc}) (\text{Tm})
\end{align*}\]

These two approaches are summarized in Figures 1 and 2:

**Figure 1**

```
S
   __________
   |      |
   NP    VP  Adv
```

**Figure 2**

```
S
   __________
   |      |
   Nom   VP
        __________
       |      |
      Prev  Aux  MV
         __________
         |      |
         Vb    Loc  Tm
```

Katz and Postal, and Owen Thomas introduce the time constituent in essentially the same place as does Lees.

Klima, however, places the time constituent under the domination of Predicate. The approach of Chomsky in *Aspects of the Theory of Syntax* is essentially the same as Klima's. The *Aspects* approach is summarized in Figure 3:\footnote{15}
Chomsky does, however, observe that one type of place adverbial "like a Time-Adverbial, has no particular connection with the Verb, but in fact modifies the entire Verb-Phrase, or perhaps the entire sentence." He further suggests that the time adverbials may be "more closely associated with the Auxiliary or with Sentence Adverbials which form a 'pre-sentence' unit in the underlying structure" than with the Predicate-Phrase. We must also note that in the model of Aspects of the Theory of Syntax Chomsky distinguishes duration and frequency time expressions from other time expressions. The duration and frequency expressions participate in Verb subcategorization and are introduced as follows:

\[
(ii) \text{VP} \rightarrow \begin{cases} 
\text{Copula} \rightarrow \text{Predicate} \\
\text{(NP)(Prep-Phrase)(Prep-Phrase)(Manner)} \\
\text{V} \left\{ \text{S'} \right. \\
\text{Predicate} \\
\end{cases}
\]

\[
(v) \text{Prep-Phrase} \rightarrow \text{Direction, Duration, Place, Frequency, etc.}
\]

Weinreich places both time and place under the domination of S. He does, however, suggest in a footnote...
that this may not be correct:

In this fragment of a grammar, a number of complicating details are disregarded, such as the question of an immediate constituent of $S$ to dominate $VP$ and the circumstances of Time and Place jointly.\(^\text{19}\)

Lyons in *Introduction to Theoretical Linguistics* (1968) also places time expressions under the domination of $S$:\(^\text{20}\)

\[(a) \Sigma \rightarrow NP + VP \text{ (Time Adverb)}\]

Fillmore in "Toward a Modern Theory of Case" (1969) suggests that the first phrase structure rule should be:\(^\text{21}\)

\[S \rightarrow Mod -- Aux -- Prop\]

Then he further suggests that

The constituent Modality $[\text{Mod}]$ contains interrogative and negative elements, sentence adverbials, time adverbials, and various other adverbial elements that are understood as modalities on the sentence as a whole rather than subconstituents of the constituent containing the main verb.\(^\text{22}\)

Thus, his approach is also closest to the alternative shown in Figure 1. Since the Proposition ($\text{Prop}$) constituent is his main focus, however, he does not discuss these suggestions about time expressions further.

In this study Chomsky's approach in *Aspects* is adopted for the introduction of the time constituent. The
possibility that time is dominated by $S$ deserves further consideration, however. What is obvious from this brief discussion of the three possibilities is that there is a lack of well defined criteria for at least some cuts in constituent structure. The merits of Chomsky's rules (iii) and (v) for introducing duration expressions will be discussed at the time when rules for generating these expressions are stated.

One of the major problems in transformational grammar is that of subcategorizing the major categories. In this study this amounts to a problem of subcategorizing Noun so that the distinction between place expressions and time expressions can be stated. We must, in other words, be able to distinguish the following two expressions:

(1) in the room
(2) in the morning

For, John met Bill in the room is a different kind of sentence from John met Bill in the morning.

In this study the subcategorization methodology outlined by Chomsky in *Aspects of the Theory of Syntax* has been adopted. This methodology can only be discussed, of course, with reference to the conception of the structure of the grammar as a whole. An overview of this structure is given in the following passage:
A grammar contains a syntactic component, a semantic component, and a phonological component. The latter two are purely interpretive; they play no part in the recursive generation of sentence structures. The syntactic component consists of a base and a transformational component. The base, in turn, consists of a categorial subcomponent and a lexicon. The base generates deep structures. A deep structure enters the semantic component and receives a semantic interpretation; it is mapped by the transformational rules into a surface structure, which is then given a phonetic interpretation by the rules of the phonological component. Thus the grammar assigns semantic interpretations to signals, this association being mediated by the recursive rules of the syntactic component.

Central to our discussion of subcategorization is Chomsky's characterization of the lexicon as a set of lexical entries, each lexical entry being "a pair (D,C), where D is a phonological distinctive feature matrix 'spelling' a certain lexical formative and C is a collection of specified syntactic features (a complex symbol)." It is the concept of complex symbol that is of fundamental importance to the syntactic component. One of the tasks of this study is, then, to characterize some aspects of the complex symbols of those nouns that can occur as the N in a time expression.

A complex symbol is a set of syntactic features. The syntactic features are, essentially, designators of the sets and subsets of the lexicon to which the lexical entry that has these features belongs. These concepts can be elucidated by the following scheme. Let us call the lexicon the set A of lexical entries. Let us assume that there are two disjoint (mutually exclusive) subsets of A; call them
B and C, and B is the complement of C. This situation is summarized in Figure 4:

![Figure 4](image)

According to Chomsky's approach, each lexical entry that is a member of B has the syntactic feature [+ B] and each lexical entry that is a member of C has the syntactic feature [+ C]. Furthermore, since B is the complement of C, every element of B will also have the feature [- C] and every element of C will have the feature [- B]. Now, let us consider the following situation:

![Figure 5](image)

where D and E are subsets of B and the intersection of D and E is not empty. Element 1 would then have the complex

The qualification "optimal" on the system of subsets is an important one. The system is optimal if it provides sufficient distinctions in the lexicon for the rules of the grammar to operate. Thus, the limits placed on the generative expectations of the grammar as a whole will determine how fine the system of subsets will have to be. Since the aim of this study is to generate some time expressions, the discussion is limited to such features as are necessary for the grammar to generate these expressions.

One rule scheme that Chomsky proposes for subcategorizing the category Noun is the following:

\[(24) \quad (i) \quad N \rightarrow [+N, \pm \text{Common}] \]
\[ (ii) \quad [+\text{Common}] \rightarrow [+\text{Count}] \]
\[ (iii) \quad [+\text{Count}] \rightarrow [+\text{Animate}] \]
\[ (iv) \quad [-\text{Common}] \rightarrow [+\text{Animate}] \]
\[ (v) \quad [+\text{Animate}] \rightarrow [+\text{Human}] \]
\[ (vi) \quad [-\text{Count}] \rightarrow [+\text{Abstract}] \]

He later removes $[+\text{Abstract}]$ as a feature: "In fact, sincerity could surely not be entered into the lexicon,
though sincere would. Sincerity is formed by a transformation, and is a 'defective Predicate' in just the same way as refusal is a defective Predicate in 'their refusal surprised me.' With this modification in mind, we can picture what is stated in rules (i) - (v) as the following system of subsets of Noun:

Figure 6

Key:  
ABCD: + Noun  
ABEF: + Common  
FECD: - Common  
GHEF: + Count  
ABHG: - Count  
GIJD: - Animate  
IHCJ: + Animate  
IKLJ: + Human  
KHCL: - Human
Thus, the five syntactic features Noun, Common, Count, Animate, Human can combine into seven distinct complex symbols, or seven distinct subsets of the set Noun. These seven complex symbols, together with Chomsky's examples of lexical items that have these complex symbols, are as follows:

1. \([+ \text{Noun}, + \text{Common}, - \text{Count}]\) -- e.g. dirt
2. \([+ \text{Noun}, + \text{Common}, + \text{Count}, - \text{Animate}]\) -- e.g. book
3. \([+ \text{Noun}, + \text{Common}, + \text{Count}, + \text{Animate}, + \text{Human}]\)
   -- e.g. boy
4. \([+ \text{Noun}, + \text{Common}, + \text{Count}, + \text{Animate}, - \text{Human}]\)
   -- e.g. dog
5. \([+ \text{Noun}, - \text{Common}, - \text{Animate}]\) -- e.g. Egypt
6. \([+ \text{Noun}, - \text{Common}, + \text{Animate}, + \text{Human}]\) -- e.g. John
7. \([+ \text{Noun}, - \text{Common}, + \text{Animate}, - \text{Human}]\) -- e.g. Fido

There are, obviously, other complex symbols that nouns can have, and Chomsky does not claim that his illustration is complete. For the generation of time expressions this system of syntactic features must be extended, particularly to distinguish those nouns that can occur in time expressions from those that cannot.

McKay, in his discussion of German time adverbials, suggests that the features \([+ \text{Place}]\) and \([+ \text{Time}]\) should be added to allow for the distinction between place expressions and time expressions. That is, Prep + NP is a place expression if the N of NP has the feature \([+ \text{Place}]\), and a
time expression if the N has the feature [+ Time]. He then points out that "any designatum of a concrete noun has the potential of being the location of some action; but possibly there are abstract nouns that cannot occur in adverbials." He then states: "If any concrete noun can occur in a place adverbial, then clearly we cannot expect the [+ Place] to occur in the entry for every concrete noun in the lexicon." There are two major difficulties with McKay's formulation. First, if we accept Chomsky's revised approach to "abstract" nouns, and there seems to be no good reason why we should not, then McKay's [+ Concrete] feature does not apply. In other words, any lexical entry that has the feature [+ N] could occur in a place expression and so the feature [+ Place] would serve no function. Second, McKay does not show that [+ Place] and [+ Time] are mutually exclusive. That is, it is more meaningful to distinguish [+ Time] and [- Time] than it is to distinguish [+ Time] and [+ Place]. The same objections apply to McKay's distinction between [+ Event] and [+ Concrete], which corresponds to his distinction between [+ Time] and [+ Place].

Jacobs and Rosenbaum also mention the features [+ Time] and [+ Place], although they do not discuss them in detail. The second objection in the previous paragraph also applies to their approach. In English Grammar II, Rosenbaum distinguishes between [+ Time] and [+ Place] as follows:
Thus, he supports our earlier suggestion that the distinction between \([+ \text{Time}]\) and \([- \text{Time}]\) is more fundamental and more revealing than McKay's distinction between \([+ \text{Time}]\) and \([+ \text{Place}]\). When he gives the complex symbols for various lexical items, however, Rosenbaum lists \([+ \text{Time}, - \text{Place}]\), which is unnecessary because the assignment of \([- \text{Place}]\) to nouns that have the feature \([+ \text{Time}]\) is predictable from rules (xv) and (xvi).\(^3\)

In this study we adopt Rosenbaum's rules (xv) and (xvi) for expressing the feature relationship between nouns that can occur as the N in \(\text{Prep} + \text{NP} \text{ time expressions}\) and nouns that cannot occur as this N. This means that we are modifying Chomsky's subcategorization scheme by adding Rosenbaum's (xv) and (xvi) in place of Chomsky's (vi) which, as we saw earlier, is removed because of his characterization of abstract nouns. Thus, \textit{room}, in the example \textit{John met Bill in the room} (p. 9), will have the complex symbol \([+ \text{N, + Common, + Count, - Animate, - Time, + Place}]\), and \textit{morning}, in the example \textit{John met Bill in the morning} (p. 9), will have the complex symbol \([+ \text{N, + Common, + Count, - Animate, + Time}]\). Rosenbaum's rules may be criticized for limiting the feature \([+ \text{Place}]\) to nouns having the feature \([- \text{Animate}]\) and thereby excluding such place expressions as on \textit{John} in the following sentence:

\textit{The insect landed on John.}
Since, however, place expressions are not the primary concern in this study, we will not try to modify the feature scheme to accommodate all place expressions. It will be found that the set of nouns having the feature \([+ \text{ Time}]\) will have to be subcategorized further to facilitate the operation of the rules that generate time expressions, but these will be discussed when they are introduced.

The syntactic features we have discussed so far Chomsky calls inherent features. The rules, like his rules (24) (i) - (vi), which introduce inherent features are called context-free subcategorization rules.\(^{34}\) Categories may also be subcategorized by context-sensitive subcategorization rules, which introduce what Chomsky calls contextual features. Contextual features are "designated in the form \([X \_ Y]\), where \(X\) and \(Y\) are strings (perhaps null) of symbols."\(^{35}\) Furthermore, the \(X\) and \(Y\) can be either category symbols or syntactic features.\(^{36}\) These contextual features, then, define the subsets of a category that may appear in particular contexts, these contexts being either categories or syntactic features. Chomsky distinguishes between two kinds of rules that introduce contextual features:

Rules \ldots\ which analyze a symbol in terms of its categorial context, I shall henceforth call strict subcategorization rules. Rules \ldots\ which analyze a symbol (generally, a complex symbol) in terms of syntactic features of the frames in which it appears, I shall call selectional rules. The latter express what are usually called 'selectional restrictions'
or 'restrictions of cooccurrence.' We shall see later that there are important syntactic and semantic differences between strict subcategorization rules and selectional rules with respect to both their form and function, and that consequently this distinction may be an important one.

Both the context-free subcategorization rules and the two types of context-sensitive subcategorization rules are assigned to the lexical component of the base.

Throughout this study the features that are discussed are assumed to be syntactic features, rather than semantic features. It is recognized, of course, that there is considerable uncertainty in the literature as to where (if anywhere) the line between syntactic and semantic features is to be drawn.

Thus, where it appears that a marker is common to both grammar and semantics, what is in fact the case is that there are two distinct markers having the same or similar names. ... Thus, grammatical and semantic markers have different theoretical import. Grammatical markers have the function of marking the formal difference upon which the distinction between well-formed and ill-formed strings of morphemes rests, whereas semantic markers have the function of giving each well-formed string the conceptual content that permits them to be represented in terms of the message they communicate to speakers in normal situations. They are concerned with different kinds of selection and they express different aspects of the structure of a language. We can, therefore, justifiably regard semantic markers as theoretical constructs distinct from the markers employed in grammatical description.

Chomsky, after presenting some arguments for and against the
possibility of assigning selectional rules to the semantic component, concludes:

In general, one should not expect to be able to delimit a large and complex domain before it has been thoroughly explored. A decision as to the boundary separating syntax and semantics (if there is one) is not a prerequisite for theoretical and descriptive study of syntactic and semantic rules.40

The features with which we are concerned in this discussion are stated because they are required for the operation of syntactic rules. Our classification of them in this sense as syntactic is supported by Chomsky's practice.

Assuming that the lexicon is a set of lexical entries, or pairs (D,C) of phonological distinctive feature matrices and complex symbols, how are these lexical entries to be introduced into the rules which generate sentences? The branching rules of the categorial component generate pre-terminal strings, that is, strings of grammatical formatives and complex symbols.41 If Q is a complex symbol in a pre-terminal string, if C is a complex symbol not distinct from Q, if Q contains the feature [+ X __ Y] and if Q appears in the frame X __ Y, then we may replace Q with D of the pair (D,C).42 This replacement operation can be regarded as a substitution transformation.43 We have, then, the scheme in Figure 7:
In addition to syntactic features that are a part of a lexical item when it is in the lexicon, there are also syntactic features which the lexical item acquires after it enters a preterminal string. For example, Chomsky suggests that in the transformational component there are rules such as the following:\textsuperscript{44}

\[
\begin{align*}
\text{Article} & \rightarrow [\alpha \text{ Gender}] \\
& \quad [\beta \text{ Number}] \\
& \quad [\gamma \text{ Case}] \\
\end{align*}
\]

\[
\begin{align*}
& \quad [\ + \ N] \\
& \quad [\alpha \text{ Gender}] \\
& \quad [\beta \text{ Number}] \\
& \quad [\gamma \text{ Case}] \\
\end{align*}
\]

where Article \ldots N is an NP. He suggests, further, that
Other agreement rules expand an already present matrix of features -- for example, the rule assigning features of a Noun to a modifying Adjective. The latter, being a lexical item, will have an independent feature matrix of its own, which is expanded by the agreement rule. The Adjective, in this case, is introduced into the prenominal position by a transformational rule, and its features will include its inherent features (those given in its lexical entry) and those associated with the complex symbol that it replaces by the lexical rule.\textsuperscript{45}

The \textit{Aspects of the Theory of Syntax} approach to the lexicon has several advantages. First, and least important theoretically, are the advantages of separating the lexicon from the categorial component rewrite rules. By removing the necessity of listing the lexicon in these rules, their number and complexity are greatly reduced. Furthermore, the rewrite rules are now essentially independent of changes in the membership of the lexicon. Whereas in the \textit{Syntactic Structures} and \textit{Third Texas Conference} models each lexical innovation would have to be listed in the phrase structure rules, now the innovations enter the lexicon directly and the categorial component remains unchanged unless there is also a concomitant change in the system of categories and subcategories, that is, unless the number or nature of the syntactic features changes. Since it is the lexicon and not the syntactic system of a language that is most subject to change, this arrangement is clearly superior to those proposed in earlier models.

A more important advantage of the syntactic
features approach is that it allows rules to be stated with reference to only those subcategories that are relevant to those rules. As was indicated earlier, for example, both [+ Animate] and [- Animate] nouns can have the feature [+ Place]. This means that rules involving only the feature [+ Place] can be stated without reference to [+ Animate].

The syntactic features approach, since it is a method of refining the subcategorization of the lexicon, also increases the ability of the rules to generate grammatical sentences. There is an associated advantage in that the features approach allows a more formal or explicit indication of degrees of grammaticalness. Chomsky notes,

The distinction between strict subcategorization features and selectional features ... appears to correlate rather closely with an important distinction in language use. Each such contextual feature is associated with a certain rule that limits lexical entries containing this feature to certain contexts. We can, in each case, construct a deviant sentence by breaking the rule.

Another advantage of this approach is that it gives a formal indication of a word as being a complex of sound, meaning, and syntactic behaviour. This approach also gives a formal indication of the relationship between a word and the rest of the grammar. The phonological distinctive features enter the phonological component and the lexical item is given a phonological interpretation, the semantic features enter the semantic component and the lexical item is given a semantic interpretation, and the
syntactic features enter the syntactic component and the lexical item becomes part of a sentence.

The syntactic features methodology we have just described is used in this study to subcategorize the lexicon, as needed for the rules of the grammar to generate time expressions, that is, the expansions of the time constituent. Within the class of time expressions there are also a number of subclasses. These, of course, are subclasses of expressions, rather than subclasses of lexical items.

Within the class of time expressions one major division is between expressions that answer the question "When?" and those that answer the question "For how long?" These are the two major subclasses to be discussed in this study. They correspond to Chomsky's division between Time and Duration. In this study the former class of time expressions is labelled Locative Time and the latter class is labelled Duration Time. These classes are distinct syntactically in that there are some verbs, such as last, which collocate only with Duration Time expressions. Within the subclass of Locative Time, two subclasses are established on the basis of their collocation with particular expansions of the Auxiliary. Those Locative Time expressions whose collocation restrictions with Auxiliary are determinable only by reference to the situational context, will be called Static Time expressions. For example, whether one says I saw Bill in 1970 or I will see Bill in
1970, depends solely on the time at which the statement is made. That is, there is no linguistic reason for making the choice. On the other hand, those Locative Time expressions whose collocation restrictions with Auxiliary are determinable without reference to the situational context, will be called Dynamic Time expressions. For example, next week and last week are Dynamic Time expressions, for it is never appropriate to say I saw Bill next week or I will see Bill last year. These subdivisions within time expressions can be summarized as follows:

```
Time
  /    \
Locative  Duration
   /    \
Static  Dynamic
```

Figure 8

These divisions are distinguished formally by the choice of Prep and Det in the Prep + NP of time expressions. Thus, to summarize, time expressions are distinguished from other expressions by their having the structure Prep + NP and by the N within this NP having the feature [+ Time]. Subdivisions within time expressions are distinguished by the choice of Prep and Det in the Prep + NP structure.

In the statement of the aim of this study two limitations were implied. The first, that is the limitation on the type of grammar that is to be constructed, has already
been defined. The second limitation is on the expressions that the grammar will generate. As has already been stated, the discussion is limited to Locative and Duration Time expressions. Of these expressions, only those which are felt to exhibit substantial generality have been included. Exceptions will no doubt be found, but it is hoped that the majority of cases are included. Furthermore, time expressions that are traditionally termed adverbial clauses of time have been excluded. This is, of course, a major omission, but it is felt that to deal with it would require too great an extension beyond the present length of the study.

This study is organized around the subclasses of time expressions that have just been outlined. The generation of Static Time expressions is discussed in Chapter 2; Chapter 3 deals with the generation of Dynamic Time expressions; Chapter 4 deals with the generation of Duration Time expressions.

Within Chapters 2 - 4 the procedure used is primarily inductive. First some time expressions are presented, and then a system of rules that generates these expressions is suggested. These expressions that are considered first are those that are felt to have the simplest structure. Then, other expressions which are more complex in structure are considered, and the initial rules are revised and more rules are added to allow the grammar to
generate these new examples. Finally, the Auxiliary expansion rule that is compatible with the generated time expressions is stated.

The Static Time expressions are discussed first because they are a kind of paradigm of the other time expressions. The Dynamic and Duration Time expressions, as will be seen, combine with Static Time expressions to form sequences of phrases in surface structure.

The complete set of rules needed to generate the time expressions discussed in this study is given in the Appendix. It is this set of rules that forms the main conclusion of the study.
I am not aware of any TG study that investigates English adverbs fully. The following include brief comments about adverbs:


Fairly extensive comments on adverbs are included in the following articles by Fillmore:

Although Fillmore's approach to adverbs is interesting, he does not make more than passing reference to time expressions. There is, however, a TG study of German time expressions:


Lees, p. 13.


Klima, p. 316.


Thomas, p. 165.


Chomsky, Third Texas Conference, p. 138.

Lees, pp. 5-6.
See p. 106 in Chomsky, *Aspects*.


Weinreich, p. 437.


Chomsky, *Aspects*, p. 84.


McKay, p. 35.

McKay, p. 35.


See the feature specification for *time* and *when* on p. 90, Rosenbaum, *English Grammar II*.

Chomsky, *Aspects*, p. 120.


38 Chomsky, *Aspects*, p. 121.


40 Chomsky, *Aspects*, p. 159.

41 Chomsky, *Aspects*, p. 84.

42 Chomsky, *Aspects*, p. 121.


44 Chomsky, *Aspects*, p. 175.


CHAPTER II

THE GENERATION OF STATIC TIME EXPRESSIONS

In the Introduction (see p. 23), Static Time expressions were defined as those Locative Time expressions whose collocation restrictions with Auxiliary are determinable only with reference to the situational context. That is, there is no independently linguistic criterion by which these restrictions can be decided. In the surface structure, Static Time expressions in English are either single prepositional phrases or sequences of prepositional phrases. We will examine first how the single phrases can be generated and then how the sequences of phrases can be generated. Since all prepositional phrases in TG are usually represented as Prep + NP, and since not all prepositional phrases are Static Time expressions, we must indicate ways in which Static Time expressions differ from the other phrases. In other words, we must specify formally which prepositions and which NP's can concatenate to generate Static Time expressions.

Let us examine the following single phrase Static Time expressions:

(1) at the sixth hour
(2) on the third day
(3) in the fourth week
(4) in the second month
(5) in the 1940th year

These phrases have the following structure:

\[ \text{Prep + the + ordinal + N} \]

If the syntactic feature \([+ \text{Time}]\) is assigned to hour, day, week, month, and year, then we can describe the structure of (1) - (5) as:

\[ \text{Prep + the + ordinal + [+ N, + Time]} \]

If we call the time constituent TP, the structure of (1) - (5) can now be described by the following P-marker:

```
\begin{center}
\begin{tikzpicture}
  \node (TP) {TP};
  \node (Prep) [below left of=TP] {Prep};
  \node (NP) [below right of=TP] {NP};
  \node (Det) [below left of=NP] {the};
  \node (N) [below right of=NP] {ordinal};
  \node (Time) [below right of=N] {\([+ N, + Time]\)};
  \draw (TP) -- (Prep);
  \draw (TP) -- (NP);
  \draw (NP) -- (Det);
  \draw (NP) -- (N);
  \draw (N) -- (Time);
\end{tikzpicture}
\end{center}
```

Figure 1

Since there are collocation restrictions between the prepositions and time nouns, we must subcategorize these nouns further. To do this we could assign the following contextual features to the nouns in question:

\begin{itemize}
  \item hour \([+ \text{at } \ldots]\)
  \item day \([+ \text{on } \ldots]\)
\end{itemize}
This procedure is not, however, the most advantageous one. It implies, first of all, that the preposition choice would have to be made first and that the noun choice could only be made with reference to the preposition choice. Also, the above contextual features could not apply when another preposition, for example before or after, occurs in the phrase. Greater generality is achieved if we subcategorize the nouns by other criteria and then state the preposition choice in terms of these new features. This approach follows Fillmore's suggestion:

... the L and T (for time) prepositions are either semantically nonempty (in which case they are introduced as optional choices from the lexicon), or they are selected by the particular associated noun ... on Monday, at noon, in the afternoon.

Let us, then, assign the following syntactic features to the nouns:

- hour [+ Hour]
- day [+ Day]
- week [+ Week]
- month [+ Month]
- year [+ Year]

Again, as [+ Time], these are inherent features. In addition
to allowing the preposition choice in expressions like (1) - (5) to be stated, they are also needed in the model to enable us to state the contexts for the various Determiner rewrite possibilities and the rules for embedding in generating surface sequences of phrases. It must be noted that the labels for these features have been chosen for convenience only; each feature represents a distinct pattern of syntactic behavior. We are not in the position to make claims about whether or not they correspond to semantic features with the same or different labels. By syntactic redundancy rules, the predictable [− A] feature is assigned to all lexical items with the feature [+ Time] that do not have the feature [+ A], where A represents "Hour," "Day," "Week," "Month," "Year."

We can now state the following rules for generating expressions (1) - (5):

Rule A.1.1
\[ TP \rightarrow\text{Prep} + NP \]

Rule A.1.2
\[ NP \rightarrow\text{Det} + N \]

Rule A.1.3
\[ N \rightarrow [+ N, + Time] \]

Rule A.1.4
\[ [+ Time] \rightarrow\{ [+ Hour] \}
\[ [+ Day] \}
\[ [+ Week] \}
\[ [+ Month] \}
\[ [+ Year] \} \]
Rule A.1.5
Det \(\rightarrow\) the + ordinal

Rule A.1.6
\[
\begin{align*}
\text{Prep} & \rightarrow \begin{cases}
\text{at} / & \ldots [+ \text{Hour}] \\
\text{on} / & \ldots [+ \text{Day}] \\
\text{in}
\end{cases}
\end{align*}
\]

Since instead of expressions (1) and (5) we usually use expressions (6a), (6b), and (7), additional rules are necessary.

(6a) at six
(6b) at six o'clock
(7) in 1940

To derive (6a) from (1), and (7) from (5), we need the following rule:

Rule A.2.1

SD: Prep + the + ordinal + \([+ N, \{ [+ \text{Hour} ] \}]\)

1 \(\underline{2}\) 3 4

SC: 1 -- 2 -- 3 -- 4 ---- 1 -- cardinal

Condition: ordinal and cardinal have the same "value".

Special problems are presented by (6b), for o'clock is not a simple lexical entry, but rather an abbreviation for a phrase. It is thus probably derived from (1) and an embedded S by way of Rule A.2.1.
We note also that we can use expression (8) instead of expression (2):

(8) on the third

This suggests the following rule:

**Rule A.2.2**

SD: Prep + the + ordinal + [+ N, + Day]

12

SC: 1 -- 2 -> 1

Let us now consider the following two Static Time expressions:

(9) on Tuesday
(10) in June

To generate these we can modify A.1.2 to A.1.2':

**Rule A.1.2'**

NP --> (Det) N

This modification would support Chomsky's approach in *Aspects*, but it would also allow us to generate (11), which is not a normal Static Time expression:

(11) *on day

If, however, we assign the feature [- Common] to Tuesday and
June, then we can modify A.1.5 to A.1.5':

**Rule A.1.5'**

\[
\text{Det} \quad \rightarrow \begin{cases} 
\text{the} & \text{+ ordinal} \\
\emptyset & \text{[- Common]} 
\end{cases}
\]

This feature modification means that we can have the following complex symbols for time nouns: [+ N, + Common, + Count, - Animate, + Time] and [+ N, - Common, - Animate, + Time].

The structure of expressions (9) and (10) can be described by the following tree diagram:

```
  TP
 / \   /
Prep /  /   
     /   
       /   
      /     
     /      
   /       
  /        
 /         
|          
|          
|          
\emptyset  [+ N
           [+ Time
           [ - Common]
```

Figure 2

The following pair of expressions presents a different kind of problem:

(12) in the morning
(13) in the spring

We note that neither of these expressions usually contains an ordinal when it appears alone or in a time sequence. If we assign the feature [+ Part of day] to morning, afternoon,
evening, and night, and [+ Season] to spring, summer, autumn, fall, and winter, then we can modify A.1.5' as follows:

**Rule A.1.5**

\[
\text{Det} \quad \begin{cases} 
\text{the + ordinal} \\
\emptyset / \quad \text{[- Common]} \\
\text{the} / \quad \text{[+ Part of day]} \\
\end{cases} \\
\text{[+ Season]}
\]

**Figure 3** will then describe the structure of (12) and (13):

\[
\begin{array}{c}
\text{TP} \\
\text{Prep} \quad \text{NP} \\
\text{Det} \quad \text{N} \\
\text{the} \quad \begin{cases} 
\text{[+ N} \\
\text{+ Time} \\
\quad \begin{cases} 
\text{Part of day} \\
\text{[+ Season]}
\end{cases}
\end{cases}
\end{array}
\]

Rule A.1.4 must, of course, be modified to allow for the generation of [+ Part of day] and [+ Season]. (This modification is given in the rules at the end of this chapter.) Rule A.1.6 is not affected.

Finally, for these single phrase Static Time expressions, we must generate expressions (14), (15), and (16):
If the features \([-\text{Common}, +\text{Festival}]\) are assigned to \textit{Christmas}, then Rules A.1 will generate (14) provided that two minor modifications to Rules A.1.4 and A.1.6 are made: [+ Festival] must be added as a possible rewrite of [+ Time] in Rule A.1.4 and the context \(\ldots [+\text{Festival}]\) must be added as a rewrite of Prep to \textit{at} in Rule A.1.6.

Expression (15) provides more difficult problems, for it can be used to answer the two questions "What time is it?" and "What part of the day is it?". We assign to \textit{noon} both the feature [+Hour] and the feature [+Part of day]. Since \textit{noon} takes a \(\emptyset\) determiner, we also assign to it the feature \([-\text{Common}]\).

Expression (16) presents a different kind of problem, for it can replace (17) when the latter expression stands alone in surface structure:

\begin{enumerate}
\item \textit{at Christmas}
\item \textit{at noon}
\item \textit{at night}
\end{enumerate}

\begin{enumerate}
\item \textit{in the night}
\end{enumerate}

Since \textit{night} is idiosyncratic in that it collocates with both \textit{in} and \textit{at}, it is more economical to indicate in the lexicon its collocation with \textit{at} and to leave Rules A.1 unchanged. Thus \textit{night} will also have the selectional feature \(+\textit{at} \ldots\).
will generate surface structure sequences of the phrases generated by Rules A.1. There are three major ways in which these sequences could be generated. We could restate Rule A.1.1 as follows:

**Rule A.1.1'**

\[ TP \rightarrow \text{Prep + NP (TP)} \]

The deep structure of a surface structure sequence of time phrases could then be represented by the following tree diagram:

![Tree diagram](image)

**Figure 4**

This approach, however, presents more problems than it solves. Although it indicates that there can be sequences of time phrases in the surface structure of a sentence, it does not show the relationship between these phrases and it does not enable us to order the phrases in any specific manner. Furthermore, it does not prevent the generation of the following ungrammatical sequence:
(18) *at six o'clock at eight o'clock at noon

In other words, there is no indication that TP's whose N's have the same complex symbols are mutually exclusive. So, clearly, unless a number of further rules are added, Rule A.1.1' is not the best approach to the problem at hand.

An alternative solution is to restate A.1.1 so that TP is considered to be a sequence of phrases, some of which may be unrealized or deleted in surface structure:

Rule A.1.1''

TP \rightarrow TP_1 + TP_2 + TP_3 + TP_4

The deep structure of a surface structure sequence of time phrases could then be represented by the following tree diagram:

![Tree Diagram]

Figure 5

This approach would, of course, indicate the order of the phrases in surface structure. It would not, however, solve the problem of showing the deep structure relationships between the phrases. Furthermore, it is not clear that the
rules required to generate Static Time expressions could then be related in any revealing way to the rules required to generate Dynamic and Duration Time expressions and some of the general rules of the grammar.

We will then examine a third approach to the generation of sequences of Static Time expressions. Consider the following two sequences:

(19) at six o'clock in the morning
(20) at six o'clock on the third day

If we restate Rule A.1.2 as follows,

**Rule A.1.2'**

\[
\text{NP} \rightarrow \text{Det} + \text{N (S')}
\]

then Rule A.1.2' is the usual rule for expanding NP: "In English, a constituent sentence of some sort can be embedded after any noun in a matrix sentence." Then S' will then be expanded by Rules A.3 as follows:

**Rule A.3.1**

\[
\text{S} \rightarrow \text{NP + Predicate-Phrase}
\]

**Rule A.3.2**

\[
\text{Predicate-Phrase} \rightarrow \text{Aux + VP (Place P) (TP)}
\]

**Rule A.3.3**

\[
\text{VP} \rightarrow \text{copula}
\]

Note that Rules A.3.1 and A.3.2 are identical to Chomsky's Rules 57(1) and 57(1i), but that Rule A.3.3 is a
simplified and modified version of his Rule 57(iii). The generation of sequences of time phrases will then be accomplished by particular embedded S's that have the structure:

\[ \text{WH} + \text{NP} + \text{Aux} + \text{cop} + \text{TP} \]

Thus we introduce the features \([+ \text{cop} + \text{Part of day}]\) and \([+ \text{cop} + \text{Day}]\) to signify that in an S whose structure is \(\text{WH} + \text{NP} + \text{Aux} + \text{cop} + \text{TP}\), the lexical item having these features can be the N of the NP dominated by S if the N of the NP dominated by TP has the feature \([+ \text{Part of day}]\) or \([+ \text{Day}]\), respectively. Then the structure of expression (19) can be described by Figures 6 and 7, where 7 is inserted in place of S' in Figure 6:

![Figure 6](image)
In order to derive the surface structure expression (19) from this deep structure, the usual relative transformation which deletes NP₂, Aux, and cop when NP₁ and NP₂ are identical will be applied. The derivation of expression (20) will be essentially the same as the derivation of expression (19), except that the N of TP₂ will have the feature [+Day] and the determiner will differ accordingly.

This approach has been chosen because it reveals the deep structure relationships between the phrases in a surface structure sequence of Static Time phrases, because it does not have to be modified in any substantial way to
account for the generation of Dynamic and Duration Time sequences, and because it supports the solution of other derivations, such as the relative clause transformation, in TG. Our assumption that the embedded S is of the form WH + NP + Aux + cop + TP, and our assignment of selectional features such as \([+ \text{cop} [+ \text{Day}]]\) supports McKay's suggestion about German place adverbials, which he later applies also to time adverbials:

Thus it appears that all co-occurrence restrictions between free place adverbials may possibly be reduced to co-occurrence restrictions between subject and predicate in sentences of the sort NP Pred sei.  

Our TP corresponds in these embedded structures to McKay's Pred. Our selectional features allow us to solve McKay's problem of explaining why his expressions (43) are acceptable and (44) are unacceptable:

\[(43a) \text{jede Woche am Dienstag} \]
\[(43b) \text{jedes Jahr im März} \]
\[(44a) \text{*jede Woche um drei Uhr} \]
\[(44b) \text{*jedes Jahr am Dienstag} \]

The relation between Woche and Dienstag is parallel to that between Jahr and März. Notice that the meaning of Dienstag, März depends on the concepts Woche, Jahr respectively.  

We can simply say that (44a) and (44b) are unacceptable because Uhr and Dienstag do not have the features that allow Woche and Jahr to appear in the respective embedded S's.
The conceptual relationships do not concern us here, although the claim might be made that our syntactic solution parallels the conceptual relationship.

The application of this approach to Dynamic and Duration expressions will be shown when their generation is discussed. It will be seen then why the first two proposed solutions to the sequence problem are inferior.

The similarity between the solutions to the time expression sequencing problem and the relative clause problem is an added advantage, for it supports both. The similarity also suggests that an embedded TP modifies the TP in the matrix sentence.

Those nouns which have both the features [+ Hour] and [+ Part of day], like noon and midnight, provide special problems when they occur in some sequences. Usually these lexical items do not appear with [+ Part of day] phrases in surface structure:

(21) (?) at noon in the morning
(22) (?) at midnight in the night

One possible solution of this problem is not to consider expressions (21) and (22) as deviant, but rather to consider them as somewhat irregular appositives. The same approach would apply to expressions (23) and (24):

(23) at twelve o'clock noon
(24) at twelve o'clock midnight

Let us now consider how the following expressions can be generated:

(25) in the morning on the third day
(26) in the morning on Sunday
(27) in the morning of the third day
(28) on Sunday morning
(29) Sunday morning

If we add the feature [cop [Day]] to the syntactic features of all lexical items that have the feature [Part of day], then (25) and (26) will be generated analogously to (19) and (20). Expression (27) can be derived from (25) by the following rule:

Rule A.4

\[
\begin{align*}
\text{SD:} & \quad \{ \text{in} \} + \text{NP}_1 + \{ \text{in} \} + \text{NP}_2 \\
\text{SC:} & \quad 1 \quad 2 \quad 3 \quad 4 \\
\text{Condition:} & \quad 1 \quad 2 \quad \text{and} \quad 3 \quad 4 \quad \text{are TP's.}
\end{align*}
\]

Expressions (28) and (29) are derived by applying Rule A.4 to (26) and then applying Rule A.5 to the resulting expression.
Rule A.5

SD: in + the + [+ Part of day] + of + [+ Day, - Common]

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

SC: 1 -- 2 -- 3 -- 4 ---> (on) -- 4 -- 2

We note that by the rules that have been stated so far, the following Static Time sequences can also be generated:

(30) at six o'clock in the morning on the third day
(31) at six o'clock in the morning on Sunday
(32) at six o'clock in the morning of the third day
(33) at six o'clock in the morning of Sunday
(34) at six o'clock on Sunday morning
(35) at six o'clock Sunday morning

We have so far considered the phrases that precede a phrase whose N has the feature [+ Day]. The following expressions illustrate which phrases can follow a phrase whose N has the feature [+ Day]:

(36) on the first day in the second week
(37) on the first day in the third month
(38) on the first day in June
(39) on the first day in spring
(40) on the first day in 1940

If we add the features [+ _____ cop [+ Week]], [+ _____ cop [+ Month]], [+ _____ cop [+ Season]], and [+ _____ cop [+ Year]]
to the feature specification of those lexical items that have the feature [+ Day], then (36) - (40) will be generated in the same manner as the other sequences we have considered. Then, expressions (38') and (39') result if Rule A.4 is applied to (38) and (39):

(38') on the first day of June
(39') on the first day of spring

Expressions (41) and (42) are derived from (38') and (39')

(41) on the first June day
(42) on the first spring day

by applying Rule A.5' (which is analogous to Rule A.5):

Rule A.5'

SD: on + Det + [+ Day, + Common] + of + \{ [+ Month, - Common] \}
\{ [+ Season] \}
1 2 3 4 5
SC: 1 -- 2 -- 3 -- 4 -- 5 --\rightarrow 1 -- 2 -- 5 --3

If Rule A.2.2 is applied to (39'), we get expression (43):

(43) on the first of June

From (43), expression (44) can be derived by applying Rule A.6 to (43):

(44) on June the first
Rule A.6

SD: on + Det + of + [+ Month, - Common]

1 2 3 4

SC: 1 -- 2 -- 3 -- 4 -- 1 -- 4 -- 2

In expressions (36) - (44), the N's have the features [+ Day, + Common]. We will now consider an expression in which the N has the features [+ Day, - Common]. The rules we have already stated will generate expression (45):

(45) on Tuesday in the second week

When Rule A.4 is applied to (45), expression (45') will result:

(45') on Tuesday of the second week

If Rule A.7 is applied to (45'), expression (46) results:

(46) on the second Tuesday

Rule A.7

SD: Prep + [+ Day, - Common] + of + Det + [+ Week]

1 2 3 4

SC: 1 -- 2 -- 3 -- 4 -- 1 -- 4 -- 2

If the features [+ _____ cop [+ Month]], [+ _____ cop [+ Season]], and [+ _____ cop [+ Year]] are assigned to all lexical items that have the feature [+ Week], then
expressions (47) - (50) can be derived in a manner analogous to the usual derivation of time sequences:

(47) in the third week of the second month
(48) in the second week of June
(49) in the third week of summer
(50) in the first week of 1940

Further, if all lexical items that have the feature [+ Season] also have the feature [+ ___ cop [+ Year]], then expression (51) will be generated in the usual way:

(51) in the summer of 1940

Let us now consider the generation of the following sequences:

(52) in June of 1940
(53) in the third month of 1940
(54) in June in the summer
(55) in the third month in the spring

Expressions (52) and (53) will be generated if we assign the feature [+ ___ cop [+ Year]] to those lexical items that have the feature [+ Month], and expressions (54) and (55) will be generated if we assign the feature [+ ___ cop [+ Season]] to the lexical items that have the feature [+ Month]. We note that a semantic problem is raised by expression (55), particularly when Rule A.4 is applied. Note also that parallel to expression (45), we can have expression (56):
(56) *in June in the third year*

When Rule A.4 is applied to (56), we get (56'):

(56') *in June of the third year*

Then, if Rule A.7' (which is analogous to Rule A.7), is applied to expression (56'),

**Rule A.7'**

\[ SD: \text{Prep} + [+ \text{Month}, - \text{Common}] + of + \text{Det} + [+ \text{Year}] \]

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 & 5 \\
\end{array}
\]

\[ SC: 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 1 \rightarrow 4 \rightarrow 2 \]

expression (57) results:

(57) *in the third June*

Expression (58) presents another type of problem:

(58) *on Sunday, the third*

The third can be derived from the third day, if we modify Rule A.2.2 as follows:

**Rule A.2.2'**

\[ SD: \underline{the} + \text{ordinal} + [+ \text{Day}] \]

\[
\begin{array}{cc}
1 & 2 \\
\end{array}
\]

\[ SC: 1 \rightarrow 2 \rightarrow 1 \]

This modification is also necessary in the model as a whole
to generate sentences such as (59):

(59) The third was sunny.

Also, an apposition relation holds between Sunday and the third. The deep structure of (58) is represented in Figures 8 and 9, where 9 is inserted where S' occurs in 8:

Figure 8

Figure 9
Note that in an apposition relation the Predicate of the embedded S is an NP rather than a TP. The rules required to derive (58) from this deep structure are needed elsewhere in the grammar, and so are not stated separately here.

In the Introduction the claim was made that time expressions can be subclassified on the basis of the criteria (linguistic or non-linguistic) which must be used to determine their collocation restrictions with the Auxiliary and on the basis of what the collocation restrictions are. The general rule for the expansion of Auxiliary when TP is a Static Time expression of the type we have so far considered is:

Rule A.8

\[
\text{Aux} \rightarrow \begin{cases} 
\text{present (M) (be + ing)} \\
\text{past (M) (have + en) (be + ing)}
\end{cases}
\]

In other words, any one of the thirty-three possible expansions of Auxiliary specified in Rule A.8 can collocate with a Static Time expression of the kind we have so far discussed to form a grammatical English sentence. Further collocation restrictions are determined by the situational context of the sentence. Thus, the sentence I will meet Bill in 1950 will not be appropriate if it is uttered in 1969. Since this restriction is not linguistic, it will not be discussed any further in this study.

There are two major reasons why Rule A.8 is important. First, it shows that the general Aux expansion
rule that is given in most TG models is an over-generalization. It is recognized, of course, that the generalization is a very useful one for many purposes. Second, Rule A.8 is an explicit formal statement of the restrictions that hold between Aux and the TP's we have discussed. This dependency of Aux on TP (or vice versa) also suggests that it may be more revealing to treat these two constituents as sharing a dominating node other than Predicate-Phrase:

![Diagram](image)

Since, however, the Auxiliary is not the focus of this study, we will continue to use the constituent structure outlined earlier.

Single phrase Static Time expressions can also be generated if the prepositions at, on and in are replaced by before or after. This suggests that Rule A.1.6 should be extended to include before and after as possible rewrites of Prep. Since, however, there are some restrictions on the occurrence of these latter prepositions in sequences of phrases, it is more convenient to replace Rule A.1.6 by A.1.6a, A.1.6b, and A.1.6c:
Rule A.1.6a

\[
\text{Prep} \longrightarrow \begin{cases} \text{Prep}_1 \\ \text{Prep}_2 \end{cases}
\]

Rule A.1.6b

\[
\begin{align*}
\text{Prep}_1 & \longrightarrow \begin{cases} \text{at} / & \cdots \{ [+ \text{Festival}] \} \\
& \text{on} / & \cdots \{ [+ \text{Hour}] \} \\
& \text{in} & \cdots \{ [+ \text{Day}] \}
\end{cases}
\end{align*}
\]

Rule A.1.6c

\[
\text{Prep}_2 \longrightarrow \begin{cases} \text{before} \\
\text{after} \end{cases}
\]

In addition to occurring wherever \text{Prep}_1 occurs in single phrase Static Time expressions, \text{Prep}_2 also occurs in expressions like the following:

(60) \((\text{at})\) \text{fifteen minutes after six o’clock}

(61) \((\text{at})\) \text{half an hour after six o’clock}

(62) \((\text{at})\) \text{two hours after six o’clock}

The structure of (60) and (62) can be described as:

\[(\text{Prep}_1) + \text{cardinal} + \text{N} + \text{Prep}_2 + \text{NP}\]

To generate this structure the rules must, of course, be modified. Rule A.1.1 must be modified to A.1.1':

Rule A.1.1'

\[
\text{TP} \longrightarrow (\text{NP}) \text{ Prep} + \text{NP}
\]

Then, Rule A.1.6a must be modified to A.1.6a':
Finally, Rule A.1.5'' must be expanded to A.1.5''':

**Rule A.1.5''''**

\[
\begin{align*}
\text{Det} & \rightarrow \begin{cases} \text{the} / \_ & \{[+ \text{Part of day}]\} \\
\emptyset / \_ & \{[+ \text{Season}]\} \\
\text{cardinal} / \_ & \text{N} + \text{Prep}_2
\end{cases}
\end{align*}
\]

Note that the Determiner expansion rule (A.1.5''') must now follow rather than precede the Preposition expansion rule (A.1.6). We will not concern ourselves with the generation of the optional at at the beginning of expressions (60) - (62). Note also that expression (61) can be generated by the above rules, provided that half an has the feature [+ cardinal].

Since expression (63) is not an acceptable Static Time expression, and since it is generated by the rules, we will have to make some further syntactic feature assignments:

(63) *two years before six o'clock

If we assign the features [+ [+ Minute] Prep\(_2\) ___] and [+ [+ Hour] Prep\(_2\) ___] to those lexical items that have the
feature [+ Hour] or [+ Part of day], then we can restrict the
collocation of NP's preceding Prep₂ to those environments
that are indicated in the syntactic feature specification of
the following NP's, provided any environments are indicated.
If no environments are indicated, then there is no restriction
on the preceding NP's.

In sequences of Static Time phrases, Prep₂ + NP
can occur wherever Prep₁ + NP occurs, although it is usually
only found as the initial phrase. Prep₂ can also occur in
the following expressions:

(64) **at four o'clock on the day before Sunday**
(65) **at four o'clock on the day two days before Sunday**
(66) **at four o'clock the day before Sunday**

We find that expression (65) consists, in surface structure,
of three phrases: (1) a Prep₁ phrase, **at four o'clock**, (2)
a Prep₁ phrase, **on the day**, and (3) a Prep₂ phrase, **two days
before Sunday**. Although phrases (1) and (3) are generated
by the rules we have already formulated, phrase (2) is new to
our model. Since phrase (2) is not a single phrase time
expression, the structure of expression (65) will have to be
different from the sequence structures we have discussed so
far. The major difference is that the embedded S containing
phrase (3) is dominated by Det rather than by NP. Thus,
the deep structure of phrases (2) and (3) is shown in
Figures 11 and 12, where Figure 12 is inserted where S'
occurs in 11:
Note that since the Determiner in Figure 11 is the + S', Rule A.1.5'' must be modified. (See the rules at the end of the chapter.) Now, in order to derive the surface structure on the day two days before Sunday from the deep structure shown in Figures 11 and 12, the following transformation is
needed:

**Rule A.9**

SD: Prep + the + WH + N₁ + cop + TP + N₂

1 2 3 4 5 6

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --> 1 -- 2 -- 6 -- 5

Condition: N₁=N₂

Phrase (2) is, of course, embedded into phrase (1) in the usual way.

Expression (64) has the same deep structure as (65), except that the cardinal in phrase (3) is one rather than two. Since one is deleted in deriving (64) from its deep structure, Rule A.10 applies after A.9:

**Rule A.10**

SD: Prep + the + N₁ + one + N₂ + Prep₂ + NP

1 2 3

SC: 1 -- 2 -- 3 --> 1 -- 3

Condition: N₁=N₂

Expression (66) is obviously derived from (64) by deleting the on in (64). To accomplish this deletion the following rule is necessary:
**Rule A.11**

SD: \( \text{Prep}_1 + \text{the} + N + \text{Prep}_2 + \text{NP} \)

1

SC: 1 \(-\) 2 \(\rightarrow\) 2

Rule A.8 gives the Auxiliary expansions that collocate with Static Time expressions in which Prep is either \(\text{Prep}_1\) or \textbf{before}. When Prep is \textbf{after}, the Static Time expression collocates with the Auxiliary expansions specified in Rule A.12:

**Rule A.12**

\[ \text{Aux} \rightarrow C (M) (\text{have} + \text{en}) (\text{be} + \text{ing}) \]

Another type of single phrase Static Time expression can be generated if \(\text{Prep}_1\) is replaced by \textbf{by}. To account for this in our model, we modify Rule A.1.6a' and add Rule A.1.6d:

**Rule A.1.6a''**

\[
\begin{align*}
\text{Prep} & \rightarrow \bigg\{ \left( \frac{\text{Prep}_2 / \text{NP} \_}{\text{Prep}_1} \right), \\
& \text{Prep}_2, \\
& \text{Prep}_3 \bigg\}
\end{align*}
\]

**Rule A.1.6d**

\( \text{Prep}_3 \rightarrow \textbf{by} \)

Unlike \(\text{Prep}_1\) and \(\text{Prep}_2\), \(\text{Prep}_3\) can only occur in the initial
phrase in a surface structure Static Time sequence. Thus, we have (67), but not (68):

(67) by six o'clock in the morning of June the third
(68) *at six o'clock by the morning of June the third

This restriction on the occurrence of $\text{Prep}_3$ can be accommodated by assigning to $\text{by}$ the strict subcategorization feature $[-\text{cop} \quad \text{NP}]$.

Rule A.13 gives the Auxiliary expansions that collocate with Static Time expressions in which $\text{Prep}$ is $\text{Prep}_3$:

Rule A.13

$$\text{Aux} \rightarrow \begin{cases} \text{present} \left\{ \left\{ \text{have} + \text{en} \right\} \left\{ \text{be} + \text{ing} \right\} \right\} \\
\text{past} \left( \text{M} \right) \left\{ \text{have} + \text{en} \right\} \left\{ \text{be} + \text{ing} \right\} \end{cases}$$

In summary, then, single phrase Static Time expressions are mainly $\text{Prep} + \text{NP}$ constructions. They are distinguished from non-time expressions by the $\text{N}$ of the NP having the syntactic feature $[+\text{Time}]$. There are three types of prepositions that can occur in Static Time expressions: (1) $\text{at}, \text{on}, \text{in}$ (the choice depending upon the features of the $\text{N}$ of the NP), (2) $\text{before}, \text{after}$ (free choice), (3) $\text{by}$ (free choice with respect to $\text{N}$, but limited to initial phrases in sequences). The Det of the NP can be
one of the following: (1) the + ordinal, (2) the + S', (3) ∅, (4) the, (5) cardinal. The choice of alternatives (1) - (4) for Det depends upon the choice of N. Choice (5) is limited to the first NP in NP + Prep + NP constructions. In these, Prep must be before or after. Surface structure sequences of time phrases are formed by the successive embedding of WH + NP + Aux + cop + TP constructions within the NP of a matrix sentence TP.

The Auxiliary expansion rule Aux ---→ C (M) (have + en) (be + ing) holds for those sentences in which TP is a Static Time expression in which Prep is after. It also holds for other Static Time expressions if C is Past. If C is Present, however, only those expansions given in Rule A.8 are appropriate if TP is Prep₁ + NP or before + NP, and only those expansions given in Rule A.13 are appropriate if TP is Prep₃ + NP.
SUMMARY OF RULES IN CHAPTER II

A.1.1 (34, 56)
\[ TP \rightarrow (NP) \text{Prep} + NP \]

A.1.2 (34, 42)
\[ NP \rightarrow \text{Det} + N (S') \]

A.1.3 (34)
\[ N \rightarrow [+ N, + Time] \]

A.1.4 (34, 38, 39)
\[ [+ Time] \rightarrow \left\{ \begin{array}{c}
[+ Hour] \\
[+ Part of day] \\
[+ Day] \\
[+ Week] \\
[+ Festival] \\
[+ Month] \\
[+ Season] \\
[+ Year]
\end{array} \right\} \]

A.1.6a (56, 61)
\[ \text{Prep} \rightarrow \left\{ \begin{array}{c}
\text{Prep}_2 / NP \\
\text{Prep}_1 \\
\text{Prep}_2 \\
\text{Prep}_3
\end{array} \right\} \]

A.1.6b (35, 39, 56)
\[ \text{Prep}_1 \rightarrow \left\{ \begin{array}{c}
at / \_ \_ \_ \_ \_ \_ \_ \left\{ [+ Festival] \right\} \\
on / \_ \_ \_ \_ \_ \_ \_ \left\{ [+ Day] \right\} \\
in \_ \_ \_ \_ \_ \_ \_ \left\{ [+ Hour] \right\}
\end{array} \right\} \]
A.1.6c (56)

\[ \text{Prep}_2 \rightarrow \{ \text{before} \} \]

A.1.6d (61)

\[ \text{Prep}_3 \rightarrow \text{by} \]

A.1.5 (35, 37, 38, 57, 59)

\[ \begin{align*}
\text{Det} & \rightarrow \{ \text{the} \ + \ \{ \text{ordinal} \} \} \\
\{ \phi / \_\_ \_ \} & \rightarrow \{ [- \text{Common}] \} \\
\{ \text{the} / \_\_ \_ \} & \rightarrow \{ [+ \text{Part of day}] \} \\
\{ \text{cardinal} / \_\_ \_ \} & \rightarrow \text{N} + \text{Prep}_2
\end{align*} \]

Transformations

A.2.1 (35)

SD: \( \text{Prep} + \text{the} + \text{ordinal} + [+ \text{N}, \{ + \text{Hour} \} \] 
\quad 1 \quad 2 \quad 3 \quad 4

SC: 1 -- 2 -- 3 -- 4 \rightarrow 1 -- cardinal

Condition: ordinal and cardinal have the same "value".

A.2.2 (36, 52)

SD: \( \text{the} + \text{ordinal} + [+ \text{N}, + \text{Day}] \)
\quad 1 \quad 2

SC: 1 -- 2 \rightarrow 1
A. 4 (47)
SD: \( \{ \text{in} \} + \text{NP}_1 + \{ \text{on} \} + \text{NP}_2 \)
\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
\end{array}
\]
SC: 1 -- 2 -- 3 -- 4 \(\rightarrow\) 1 -- 2 -- of -- 4
Condition: 1 -- 2 and 3 -- 4 are TP's.

A. 5 (48)
SD: \text{in} + \text{the} + [+ Part of day] + of + [+ Day, - Common]
\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
\end{array}
\]
SC: 1 -- 2 -- 3 -- 4 \(\rightarrow\) (on) -- 4 -- 2

A. 5' (49)
SD: \text{on} + \text{Det} + [+ Day, + Common] + of + \{ [+ Month, - Common] \}
\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
\end{array}
\]
SC: 1 -- 2 -- 3 -- 4 -- 5 \(\rightarrow\) 1 -- 2 -- 5 -- 3

A. 6 (50)
SD: \text{on} + \text{Det} + \text{of} + [+ Month, - Common]
\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
\end{array}
\]
SC: 1 -- 2 -- 3 -- 4 \(\rightarrow\) 1 -- 4 -- 2

A. 7 (50)
SD: \text{Prep} + [+ Day, - Common] + of + \text{Det} + [+ Week]
\[
\begin{array}{cccc}
1 & 2 & 3 & 4 & 5 \\
\end{array}
\]
SC: 1 -- 2 -- 3 -- 4 -- 5 \(\rightarrow\) 1 -- 4 -- 2
A.7' (52)
SD: Prep + [+ Month, - Common] + of + Det + [+ Year]
   1  2  3  4  5
SC: 1 -- 2 -- 3 -- 4 -- 5 ----> 1 -- 4 -- 2

A.9 (60)
SD: Prep + the + WH + N1 + cop + TP + N2
   1  2  3  4  5  6
SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 ----> 1 -- 2 -- 6 -- 5
Condition: N1 = N2

A.10 (60)
SD: Prep + the + N1 + one + N2 + Prep2 + NP
   1  2  3
SC: 1 -- 2 -- 3 ----> 1 -- 3
Condition: N1 = N2

A.11 (61)
SD: Prep1 + the + N + Prep2 + NP
   1  2
SC: 1 -- 2 ----> 2
NOTES TO CHAPTER II

1. The feature [+ Time] is defined in the Introduction, p. 16. Our formulation satisfies the following condition suggested by McKay: "Somewhere in each adverbial there must occur a lexical element whose complex symbol contains a feature that specifies what sort of adverbial we have." ("Some Generative Rules for German Time Adverbials," p. 27) Since all nouns that have the feature [+ Time] also have the features [+ Count, - Animate], the feature specification of the [+ Time] nouns need not include [+ Count, - Animate].

2. This representation is essentially the same as that contained in Jerrold J. Katz and Paul M. Postal, An Integrated Theory of Linguistic Descriptions (p. 129 and following) and in McKay's article.

3. Note that these contexts are only loosely defined, for strictly speaking at, on, and in should be defined by their complex symbols. Since the context is not simply Prep, the features we are here proposing for the nouns would be selectional rather than strict subcategorization. The distinction between these two types of contextual features, selectional and strict subcategorization, is made by Chomsky on p. 95 of Aspects.

4. This would negate Chomsky's suggestion in Aspects that Noun is selectionally dominant. (See Aspects, pp. 115-116) We are trying, wherever possible, to stay within the model suggested by Chomsky.


6. Some of the problems related to this distinction are mentioned in the Introduction, pp. 18-19.

7. This is by no means a complete set of rules for generating single phrase Static Time expressions; these are simply ones that are needed to generate expressions (1) - (5). All of these, except A.1.3, are later revised to accommodate the generation of other Static Time expressions.

8. The problem of stating the "value" relationship between the cardinals and ordinals is a problem that will have to be solved for the TG model as a whole, and does not concern us here. Rule A.2.1 states that the SC will be made if the cardinal and the ordinal are assigned the same "value." It may very well be the case that the ordinals are derived from the cardinals. Our rule would then have the condition that the ordinal must have been derived from the cardinal and the rule would reverse the derivation process.
"OED, II, p. 510: "(The hour of the day is expressed by a cardinal numeral, followed by a phrase which was originally a. of the clock, now only retained in formal phraseology; shortened subsequently to b. of clock, c. a clock ... d. o'clock, the current modern form; rarer obs. variants were e. at the clock, and clock simply.)"

Our proposed derivation of expression (6b) is extremely tentative, and raises the problem of how isolated expressions can best be handled in the TG model. First, of the clock is probably a genitive derived from the clock has A, by way of a genitive transformation. Underlying (6b), then, there is probably the following structure:

![Tree diagram]

A special transformation would then change of the clock to o'clock. The deletion of NP and cop would give at the sixth hour o'clock. Next, Rule A.2.1, when applied to at the sixth hour, would give at six o'clock.


12These features have the same status as [+ Day], etc.

13See McKay, p. 28.


15Chomsky, Aspects, p. 106.
Chomsky, *Aspects*, p. 107. Rule 57(iii) has been stated in this form here because copula is the only immediately relevant VP for the present purposes.

The transformation is not stated here because it is a general rule in the TG model.

McKay, p. 31.

McKay, p. 34.

In *Syntactic Structures* (The Hague: Mouton & Co., 1957), p. 111, Chomsky states the following Auxiliary expansion rule:

\[ \text{Aux} \rightarrow \text{C (M) (have + sn) (be + ing)} \]

There does not appear to be any TG model in which the restrictions on this rule when the Auxiliary appears with particular TP's have been stated.

It is not yet clear whether it is Aux or TP that is selectionally dominant. In other words, it is not clear whether or not it is more revealing to state the TP choice in the context of certain expansions of Aux or to state the Aux expansion choice in the context of particular types of TP's. Since for our purposes it is simpler to use the second alternative, that is the method that has been adopted in this study.
CHAPTER III

THE GENERATION OF DYNAMIC TIME EXPRESSIONS

In the Introduction, Dynamic Time expressions were defined as those time expressions whose collocation restrictions with Auxiliary are determinable without reference to the situational context. In surface structure, Dynamic Time expressions in English are either single words, single phrases, or sequences of phrases. In surface structure sequences, Dynamic Time expressions can combine with Static Time expressions. When this is the case, the Dynamic phrase or phrases determine which Auxiliary expansions can collocate with the TP. As in Chapter 2, we will first examine how the single phrase Dynamic Time expressions can be generated, and then how the sequences of phrases can be generated.

Let us first consider the following Dynamic Time expressions:

(1) one day
(2) one week
(3) one month
(4) one year

Expressions (1) - (4) will be generated by the rules we have already formulated in Chapter 2, provided the following rules are added:
Rule B.1

\[
\text{Det} \rightarrow \begin{cases} 
\{\text{Det}_1\} & \text{[+ Day, + Common]} \\
\{\text{Det}_2\} & \text{[+ Week]} \\
\text{Det}_1 & \text{[+ Month, + Common]} \\
\end{cases} 
\text{[+ Year]}
\]

Rule B.2

\[\text{Det}_2 \rightarrow \text{one}\]

\text{Det}_1 \text{ is Det as we have considered it so far, and is expanded by Rule A.1.5; that is, Rule A.1.5 follows Rule B.2. Since the preposition is usually omitted in these expressions, we add the following optional rule:}

Rule B.3

\text{SD: Prep}_1 + \text{Det}_2 + \text{N}

\begin{array}{ccc}
1 & 2 & 3 \\
\end{array}

\text{SC: 1 -- 2 -- 3 ---} \rightarrow 2 -- 3

In time sequences, (1) -- (4) behave in the same way as the Static phrases. However, it is at least stylistically undesirable to have more than one of them together in the surface structure sequence, and so the following optional rule is needed:}
Rule B.4

SD: \[ \text{Prep}_1 + \text{Det}_2 + \text{N} + \text{Prep}_1 + \text{Det}_2 + \text{N} \]

SC: 1 \rightarrow 2 \rightarrow 1

These rules now allow us to generate expression (5), but exclude (6) and (7):

(5) one day in June of one year
(6) *one day one year
(7) *one day in one month in 1940

Although expressions (8) - (12) appear to be single phrase expressions, they are derived transformationally from sequences (13) - (17):

(8) one noon
(9) one morning
(10) one June
(11) one spring
(12) one Christmas
(13) at noon on one day
(14) in the morning on one day
(15) in June in one year
(16) in the spring in one year
(17) at Christmas in one year

Expressions (13) - (17) are, of course, generated in the
usual way by embedding an S after the N of the matrix TP. To (13) - (17) Rule B.5 is then applied optionally to generate (8) - (12):

**Rule B.5**

\[
\text{SD: } \text{Prep}_1 + \left\{ \text{the} \right\} + N + \text{Prep}_1 + \text{Det}_2 + N
\]

\[
1 \quad 2 \quad 3 \quad 4 \quad 5
\]

\[
\text{SO: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 4 \rightarrow 2
\]

Notice that this approach prevents the generation of the following unacceptable expressions:

(18) *one noon on Tuesday
(19) *one morning on Tuesday
(20) *one June in 1940
(21) *one spring in 1940
(22) *one Christmas in 1940

Let us now consider the generation of the following expressions:

(23) one June day
(24) one summer day
(25) one Christmas day
(26) one morning in the summer
(27) one summer morning
(28) one Tuesday morning

By the rules we have already stated, we can generate (29):
(29) one day in June

Now, in order to derive (23) from (29), we need Rule B.6:

Rule B.6

SD: Det₂ + N + Prep₁ + \{∅\} + N

1 2 3 4 5

SC: 1 -- 2 -- 3 -- 4 -- 5 ---→ 1 -- 5 -- 2

This rule will also, of course, generate (24) and (25) from (30) and (31):

(30) one day in the summer
(31) one day at Christmas

Expression (26) is derived from expression (32) by applying Rule B.5 to the first two phrases of (32):

(32) in the morning of one day in the summer

Expression (27) is derived from (26) by applying Rule B.6 to (26). Expression (28) can be derived from (33),

(33) in the morning of one Tuesday

if Rule A.5 is modified to B.7:

Rule B.7

SD: in + the + [+ Part of day] + of + Det + \{[+ Day, - Common]\} \{[+ Festival, - Common]\}

1 2 3 4 5

SC: 1 -- 2 -- 3 -- 4 -- 5 ---→ 4 -- 5 -- 2
Another type of Dynamic Time expressions is represented by the following examples:

(34) on a Sunday
(35) on a night in June
(36) on a day in June

These can be derived from (37) - (39),

(37) one Sunday
(38) one night in June
(39) one day in June

by applying Rule B.8:

Rule B.8

\[
\begin{align*}
\text{SD: } & \text{one } + \left\{ \begin{array}{l}
\text{[+ Day]} \\
\text{[+ Part of day]} \end{array} \right\}_\text{s'} \\
\text{1} & \quad 2
\end{align*}
\]

SC: 1 -- 2 \(\rightarrow\) on a -- 2

Rule B.8 applies after B.5 and before B.6. To allow B.6 to apply to the result of B.8, the SD of B.6 must be modified as follows:

Rule B.6'

\[
\begin{align*}
\text{SD: } & (\text{Prep}_1) + \left\{ \begin{array}{l}
\text{one} \\
\text{a}\end{array} \right\}_1 + N + \text{Prep}_1 + \left\{ \begin{array}{l}
\emptyset \\
\text{the}\end{array} \right\}_4 + N \\
\text{1} & \quad 2 \quad 3 \quad 4 \quad 5
\end{align*}
\]

SC: 1 -- 2 -- 3 -- 4 -- 5 \(\rightarrow\) 1 -- 5 -- 2
We will now consider the generation of the following expressions:

(40) (at) one time
(41) (at) some time
(42) some time in the morning
(43) some time on Sunday
(44) some time in June
(45) some time in the spring
(46) some time in 1940

Several modifications in the rules stated so far are needed. First, we restate Rule B.2 as B.2':

**Rule B.2'**

\[
\text{Det}_2 \rightarrow \left\{ \begin{array}{c}
\text{one} \\
\text{some}
\end{array} \right\}
\]

Next, we assign to time the features \([+ \text{Time}, + \text{General}]\) and \([+ \_\_ \text{cop} [+ \text{Time}, - \text{General}]\). Finally, we add \(_\_ \_ [+\text{General}]\) as a context for the rewrite of Det as Det\(_2\) in Rule B.1.

We note that these Dynamic Time expressions that contain Det\(_2\) do not contain Prep\(_2\) or Prep\(_3\). To allow for this, we modify Rule B.2' as follows:

**Rule B.2''**

\[
\text{Det}_2 \rightarrow \left\{ \begin{array}{c}
\text{one} \\
\text{some}
\end{array} \right\} / \text{Prep}_1 \_\_ \_ N
\]
The Dynamic Time expressions in which Det$_2$ is **one** or **some** collocate with the expansions of the Auxiliary specified in Rule B.9:

**Rule B.2**

\[
\text{Aux} \rightarrow \begin{cases} 
\text{present (M)} \{ \text{have} + \text{en} \} \\
\text{be} + \text{ing} \\
\text{past (M)} \{ \text{have} + \text{en} \} \{ \text{be} + \text{ing} \}
\end{cases}
\]

So far we have considered those Dynamic Time expressions in which Det$_2$ is **one** or **some**. Dynamic Time expressions are also generated if Det$_2$ is **this**, **that**, **next**, or **last**. This means that Rule B.2 must be further modified:

**Rule B.2'**

\[
\text{Det}_2 \rightarrow \begin{cases} 
\text{one} \{ \text{Prep}_{1} \text{ ___ N} \} \\
\text{some} \{ \text{Prep}_{1} \text{ ___ N} \} \\
\text{this} \\
\text{that} \\
\text{next} \\
\text{last}
\end{cases}
\]

Rules B.3, B.4, and B.5 remain unchanged.

Since **this** day may be rewritten as **today**, we need the following rule:

**Rule B.10**

\[
\text{this} \text{ day} \rightarrow \text{today}
\]
Since in various contexts such as discourse, Rule B.10 will have to be blocked, it is regarded here as being optional rather than obligatory. One advantage of this approach is that it explains why we have expressions (47) and (48) instead of (49) and (50):  

(47) this noon
(48) this morning
(49) *today noon
(50) *today morning

To account for the fact that today cannot be followed by another time phrase in surface structure, Rule B.10 must be modified as follows:

Rule B.10'

SD: this + day#
    1 2 3
SC: 1 -- 2 -- 3 ---→ today

Since at this time can be rewritten as now, Rule B.11 is needed:

Rule B.11

SD: (at)+this+time#
    1 2 3 4
SC: 1 -- 2 -- 3 -- 4 ---→ now
The expansions of Auxiliary with which Prep₁ Dynamic Time expressions in which Det₂ is this collocate are summarized in Rule A.12.

Parallel to Rule B.10, Rule B.12 is needed to rewrite at that time as then:\[10\]

**Rule B.12**

SD: (at) + that + time \\
1 2 3 4

SC: 1 -- 2 -- 3 -- 4 --→ then

The expansions of Auxiliary with which Prep₁ Dynamic Time expressions in which Det₂ is that collocate are summarized in Rule A.8.

Let us now consider the Dynamic Time expressions in which Det₂ is last or next. Since in some contexts last day can be rewritten as yesterday and next day as tomorrow, we need the following two rules:

**Rule B.13**

last day \(\rightarrow\) yesterday

**Rule B.14**

next day \(\rightarrow\) tomorrow

Now, since Rules B.10', B.13, and B.14 are very similar, we can, for the sake of simplicity, combine them as the following:
Similarly, we can restate Rules B.11 and B.12 as follows:

**Rule B.15**

\[
\begin{array}{c|c|c}
\text{this} & \text{today} \\
\text{last} + \text{day} \# & \rightarrow & \text{yesterday} \\
\text{next} & & \text{tomorrow}
\end{array}
\]

When the [+ Day] phrases in which Det\(_2\) is next or last are preceded in surface structure by [+ Part of day] phrases, the following rule may apply after B.15:\(^{11}\)

**Rule B.16**

\[(\text{at}) + \left| \begin{array}{c}
\text{this} \\
\text{that}
\end{array} \right| + \text{time} \# \rightarrow \left| \begin{array}{c}
\text{now} \\
\text{then}
\end{array} \right|\]

This rule allows us to generate expressions like (51) and (52):

(51) *yesterday afternoon*

(52) *tomorrow morning*

When Det\(_2\) is next, the TP with Prep\(_1\) collocates with the Auxiliary expansions given by Rule B.18. When it is last, the expansions are given by Rule B.19.\(^{12}\)
Rule B.18

\[
\text{Aux} \rightarrow \begin{cases} 
\text{present (M)} \ (\text{be + ing}) \\
\text{must (be + ing)} \\
\text{can} \\
\text{may} \\
\text{will} \\
\text{shall} \\
\text{past} \\
(\text{have + en})(\text{be + ing}) \\
\text{past (M)} \\
\end{cases}
\]

Rule B.19

\[
\text{Aux} \rightarrow \begin{cases} 
\text{present} \ (\text{may}) \\
\text{must} \\
\text{have + en (be + ing)} \\
\text{past (M)} \\
\text{past (can)} \\
\end{cases}
\]

A time expression in which there are both Static and Dynamic Time phrases will collocate only with those Auxiliary expansions that are compatible with the Dynamic Time phrase. In a sequence of Dynamic Time phrases the embedded TP determines the Auxiliary expansion collocation. Thus, the appropriate Auxiliary expansions for expression (53) are given by Rule B.18.

(53) one day last year

We will now consider the generation of Dynamic Time expressions containing Prep2. Note that Rule B.2'"' excludes one and some as Det2 in Prep2 time expressions. Expressions
(54) - (56), however, can be generated by the rules stated in Chapter 2 and earlier in this chapter:

(54) two hours before this time
(55) two years before this day
(56) two weeks before last day

In addition, (57) can be derived from (56) by first applying

(57) two weeks ago yesterday

Rule B.20, and then applying Rule B.16.13

Rule B.20

SD:  \( \text{cardinal} + N + \text{before} + \text{Det}_2 + N \)

SC:  \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow \text{ago} \rightarrow 3 \)

Expressions (58) and (59) can be derived from (54) and (55)

(58) two hours ago
(59) two years ago

by first applying Rule B.20, and then applying Rule B.21:

Rule B.21

SD:  \( \text{cardinal} + N + \text{ago} + \text{this} + N \)

SC:  \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 2 \)
When Det₂ occurs in a TP with before, the Auxiliary expansions that are compatible with this are given in Rule B.22:

**Rule B.22**

\[\begin{align*}
\text{present} & \quad \{ \begin{array}{l}
\text{can} \\
\text{may} \\
\text{must}
\end{array} \} \\
\text{aux} & \quad \frac{\{ \begin{array}{l}
\text{will} \\
\text{shall}
\end{array} \}}{\text{be} + \text{ing}} \\
\text{past} & \quad \{ \begin{array}{l}
\text{can} \\
((M) \text{ have} + \text{en})(\text{be} + \text{ing})
\end{array} \}
\end{align*}\]

Rule A.12 gives the Auxiliary expansions that are compatible with the before expressions when Det₂ is that. When Det₂ is last, Rule B.23 gives the appropriate Auxiliary expansions:

**Rule B.23**

\[\begin{align*}
\text{present} & \quad \{ \begin{array}{l}
\text{can} \\
\text{may} \\
\text{must}
\end{array} \} \quad \text{have} + \text{en} (\text{be} + \text{ing}) \\
\text{aux} & \quad \{ \begin{array}{l}
\text{can}
\end{array} \}
\end{align*}\]

When Det₂ is next, Rule B.24 gives the appropriate Auxiliary expansions:
When Det$_2$ occurs in a TP with after, the Auxiliary expansions that are compatible with this are given in Rule B.25:

\[
\text{Rule B.25}
\]

\[
\text{Aux \rightarrow}
\]

\[
\begin{align*}
\text{present} & : \{ \text{must} \{ \begin{array}{l}
\text{have + en} \\
\text{be + ing}
\end{array} \}, \\
\text{can} \{ \begin{array}{l}
\text{may} \{ \begin{array}{l}
\text{have + en} \\
\text{be + ing}
\end{array} \}, \\
\text{will} \}
\end{array} \}, \\
\text{past} & : \{ \text{must} \{ \begin{array}{l}
\text{have + en} \\
\text{be + ing}
\end{array} \}, \\
\text{can} \{ \begin{array}{l}
\text{may} \{ \begin{array}{l}
\text{have + en} \\
\text{be + ing}
\end{array} \}, \\
\text{will} \}
\end{array} \}
\end{align*}
\]

The compatible expansions when Det$_2$ is that are given in Rule A.12. Rule B.26 gives the Auxiliary expansions compatible with next:
Rule B.26

Aux ----> 
- present
- past M (have + en) (be + ing)

Rule B.27 gives the Auxiliary expansions compatible with last:

Rule B.27

Aux ----> 
- present
- past 

Dynamic Time expressions in which Prep is Prep₃ can be generated by the rules that have already been stated. When Det₂ is next, the Auxiliary expansions with which the TP with Prep₃ will collocate are given in Rule B.24. Rule A.13 gives the compatible expansions when Det₂ is that, and Rule B.28 gives the expansions for Prep₃ phrases when Det₂
is last:

**Rule B.28**

\[
\begin{align*}
\text{Aux} \quad &\rightarrow \quad \begin{cases}
\text{present} & | \quad \text{can} \quad \left\{ \text{may} \right\} \quad \text{have} + \text{en} \quad \left( \text{be} + \text{ing} \right) \\
\text{past} & \quad \left\{ \begin{array}{c}
\text{can} \\
((M) \text{ have} + \text{en}) (\text{be} + \text{ing})
\end{array} \right.
\end{cases}
\end{align*}
\]

When \( \text{Det}_2 \) is **this**, the general rule for the compatible Auxiliary expansions is Rule B.24. If, however, the TP has the structure \( \text{Prep}_3 + \text{Det} + N + \text{Prep}_1 + \text{this} + N \), and the time of coding is later than the time specified by the TP, the appropriate expansions are given by Rule B.28.

As we have seen, then, it is primarily the Determiner that distinguishes between Static and Dynamic Time phrases. The Determiner in a Dynamic Time phrase can be **this**, **that**, **next**, **last**, **one**, or **some**, but the last two of these are restricted to phrases in which \( \text{Prep} \) is \( \text{Prep}_1 \). Whereas in Static Time phrases the choice of a particular \( \text{Det}_1 \) depends upon the syntactic features of the \( N \), in Dynamic Time phrases the choice of a particular \( \text{Det}_2 \) is not restricted in this way. \( \text{Det}_2 \) is, however, restricted in deep structure to occurring prior to \( N \)'s that have the features \ [+ General], \ [+ Day, + Common], \ [+ Week], \ [+ Month, + Common], \) or \ [+ Year]. Dynamic Time expressions which in surface structure have \( N \)'s with features other than the above, are derived by embedding
S's with TP dominated N's having these features into Static TP's.

The collocation restrictions between Dynamic Time expressions and expansions of the Auxiliary depend upon the Determiner. When Det$_2$ is that, the appropriate Auxiliary expansions for the Dynamic phrases are the same as those for Static phrases. The Auxiliary expansions that collocate with TP's in which Det$_2$ is next or last are given by special rules. When Det$_2$ is this, the Prep$_1$ phrases collocate with the same Auxiliary expansions as do Static Time phrases. The Prep$_2$ phrases, however, behave differently. The Auxiliary expansions which are usually compatible with before are given in Rule B.22. When, however, the TP is before this Thursday, the compatible expansions are given by Rule A.8 if the day of coding is Wednesday, and by Rule B.23 if the day of coding is Friday. In other words, if the TP is before + Det + N + Prep$_1$ + this + N, the Dynamic Time expression will behave like a Static Time expression in that its collocation restrictions cannot be determined without reference to the situational context. Similarly, the Auxiliary expansions that are usually compatible with after + this + N expressions are given in Rule B.25. If, however, the TP is after this Thursday, and the time of coding is Saturday, then the compatible expansions are given in Rule B.27. The Prep$_3$ phrases in which Det$_2$ is this will collocate with the same Auxiliary expansions as those in which Det$_2$ is next. Again, if the
time of coding is earlier than the time specified by the TP, Prep₃ + Det + N + Prep₁ + this + N expressions will have different collocation restrictions, in this case those of Prep₃ phrases in which Det₂ is last.
SUMMARY OF RULES IN CHAPTER III

B.1 (72, 77)

\[
\text{Det} \rightarrow \begin{cases} 
\{ \text{Det}_1 \} / \{ \text{Det}_2 \} / \{ \text{Det}_3 \} \\
\text{Det}_1 
\end{cases}
\]

\{ [+ General] \\
\{ [+ Day, + Common] \\
\{ [+ Week] \\
\{ [+ Month, + Common] \\
\{ [+ Year] 
\}

B.2 (72, 77, 78)

\[
\text{Det}_2 \rightarrow \begin{cases} 
\{ \text{one} \} / \{ \text{some} \} \\
\{ \text{this} \} \\
\{ \text{that} \} \\
\{ \text{next} \} \\
\{ \text{last} \} \\
\end{cases}
\]

\{ / \text{Prep}_1 \ldots \text{N} \}

Transformations

B.3 (72)

SD: \text{Prep}_1 + \text{Det}_2 + \text{N} \\
1 2 3

SC: 1 \rightarrow 2 \rightarrow 3 \rightarrow 2 \rightarrow 3

B.4 (73)

SD: \underbrace{\text{Prep}_1 + \text{Det}_2 + \text{N}}_{1} + \underbrace{\text{Prep}_1 + \text{Det}_2 + \text{N}}_{2}

SC: 1 \rightarrow 2 \rightarrow 1

Condition: \text{Det}_2 = \text{one} \text{ or } \text{Det}_2 = \text{some}
\
\text{B.5 (74)}
\text{SD: } \{\text{Prep}_1 + \{\phi\} + N + \text{Prep}_1 + \text{Det}_2 + N\}
\text{SC: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 4 \rightarrow 2

\text{B.6 (76)}
\text{SD: } \{\text{one} + \{[+ \text{Day}] + \text{Day}\} + \text{Part of day}}\}
\text{SC: } 1 \rightarrow 2 \rightarrow \text{on a} \rightarrow 2

\text{B.6 (75, 76)}
\text{SD: } (\text{Prep}_1) + \{\text{some} + \{\text{one} + \text{a}\} + N + \text{Prep}_1 + \{\phi + \text{the}\} + N\}
\text{SC: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 1 \rightarrow 5 \rightarrow 2

\text{B.7 (75)}
\text{SD: } \text{in + the + [+ Part of day] + of + Det + [+ Day, -Common]}
\text{SC: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 4 \rightarrow 5 \rightarrow 2
B.15 (78, 80, 81)

| this | + day # ---| today |
| last | | yesterday |
| next | | tomorrow |

B.16 (79, 80, 81)

( at) + | this | + time # ---| now |
| that | | then |

B.17 (81)

SD: Prep₁ + the + [+ Part of day] + Prep₁ + \{ yesterday \}
     \{ tomorrow \}

1 2 3 4 5
SC: 1 -- 2 -- 3 -- 4 -- 5 ---| 5 -- 3

B.20 (83)

SD: cardinal + N + before + Det₂ + N

1 2 3
SC: 1 -- 2 -- 3 ---| 1 -- ago -- 3

B.21 (83)

SD: cardinal + N + ago + this + N

1 2 3
SC: 1 -- 2 -- 3 ---| 1 -- 2
NOTES TO CHAPTER III

1 The rules introduced or modified in this chapter are numbered B.1, etc., to distinguish them from those in Chapters 2 and 4, where they are numbered A.1 and C.1, respectively.

2 In other words, the rules stated in Chapter 2 also apply to these expressions. Thus, the features we introduced there to show ordering restrictions are also needed here, and this further supports our approach.

3 This rule is optional because some speakers accept expressions such as (6) and (7).

4 Alternatively, we could have restricted Det$_2$ to the environment Prep$_1$ _____ N. This, however, would have meant that a Det$_3$ would have had to be introduced to generate the other Dynamic Time expressions and this in turn would have complicated other rules. Also, it would have prevented us from generalizing that Dynamic phrases are characterized by having Det$_2$ as the Determiner.

5 Note that B.9 differs from A.8 in that B.9 allows the expansion present (M) have + en and excludes present (M).

6 Expressions in which this, that, next, or last occur with Prep$_2$ and Prep$_3$ will be discussed later in this chapter.

7 It is not at all clear that this rule, as it is stated here, is legitimate. However, since there does not appear to be an acceptable alternative, and since the rule does allow us to generate acceptable time expressions that we could not generate without it, we will use the rule, with the reservation that it may need to be formalized in another way.

8 It is recognized that for some speakers (49) may be acceptable.

9 The same restrictions hold as for the generation of today.

10 This rule is governed by the same restrictions as Rule B.10.

11 One exception to Rule B.17 and B.15 is last night.

12 Since present + must is the same as past + must, we could have simplified these rules by allowing only the former. In all the Auxiliary expansion rules we have confined ourselves to the Auxiliary in the "main clause" and have not considered conditional clauses.
There is no historical evidence for the relationship between *before* and *ago* implied by Rule B.19. *Ago* will be treated as Prep₂.

When N has the feature [+ General], different expansions will apply if the subject NP is I. Rule B.24 applies if the subject NP is not I.

The condition (which is not stated when B.4 is introduced on p. 73) is placed on this rule to allow *one day next year*, but to exclude *one day one year*. 
CHAPTER IV

THE GENERATION OF DURATION TIME EXPRESSIONS

Duration Time expressions were defined in the Introduction as those expressions that answer the question "For how long?" In this chapter we consider how these expressions are generated, how sequences containing these expressions are generated, and how they collocate with the Auxiliary.

One type of Duration Time expressions is represented by the following:

(1) for fifteen minutes
(2) for two hours
(3) for five days
(4) for three weeks
(5) for four months
(6) for nine years

These expressions have the following structure:

\[ \text{for} + \text{cardinal} + [+N, +Time] \]

To generate this structure we need to make several modifications in our rules. If we call \textit{for} Prep$_4$, then we can modify Rule A.1.6a to C.1 and add Rule C.2:
Rule 0.1

\[
\begin{align*}
\text{Prep} & \rightarrow \left\{ \begin{array}{c}
\text{Prep}_1 \\
\text{Prep}_2 \\
\text{Prep}_3 \\
\text{Prep}_4
\end{array} \right. \\
\text{Prep}_2 / \text{NP}
\end{align*}
\]

Rule 0.2

\[
\text{Prep}_4 \rightarrow \text{for}
\]

In Rule A.1.5, the context for rewriting Det (i.e. \( \text{Det}_1 \)) as cardinal must be extended to include \( \text{Prep}_4 \) N. The cardinal class includes, in addition to the cardinal numbers, items such as the following: a few, some, many, a number of.¹ Since this is not a matter peculiar to time expressions, we do not state special rules for generating (7) - (10):

(7) for a few years
(8) for some years
(9) for many years
(10) for a number of years

Similarly, since cardinal can occur anywhere with a number of special modifiers, we do not need to state special rules for generating (11) - (17):²

(11) for almost nine years
(12) for nearly nine years
(13) for just nine years
Also, the grammar as a whole will have to account for the following and or constructions:

(18) for nine years and three months
(19) for nine or ten years

Expressions (1) - (19) are, of course, single phrase Duration Time expressions. We will now consider how they collocate in surface structure with Locative (Static and Dynamic) Time phrases, and how these surface structure sequences can be generated.

In surface structure sequences of time phrases, Prep\textsubscript{4} phrases must precede Prep\textsubscript{1} and Prep\textsubscript{2} phrases. To allow for this restriction, we assign to for the strict subcategorization feature [- cop ___ NP].

Let us now consider the following time expressions:

(20) for fifteen minutes on Tuesday
(21) for two hours on Tuesday
(22) for five days in the second week
(23) for four months in 1940

We propose that the deep structure of (23) is described by Figures 1 and 2, where 2 is inserted where S' occurs in 1:
Figure 1

Figure 2
Expressions (20) - (22) will, of course, have similar deep structures. A minor modification in features is required to accommodate expression (20), however. Since minute cannot occur after Prep₁, Prep₂, or Prep₃, but can occur before Prep₂ and after Prep₄, we assign to it the features [+ Time, + Minute, + _____ Prep₂, + Prep₄ ... ___].

The deep structure proposed in Figures 1 and 2 is different from that implied by Chomsky in Aspects of the Theory of Syntax. For sentence (24), his rules would give the deep structure shown in Figure 3.  

(24) John worked for three hours on Saturday.
The significant difference between Figure 3 and Figures 1 and 2, for our purposes, is in the relationship between Duration and Time (our Locative). In Chomsky's model there does not appear to be any relationship between the constituents Duration and Time. Our approach, however, claims that there is a relationship between them, and further that there are collocation restrictions between the N in the Duration expression and the N in the embedded Locative expression. Our approach also relates the structure of Duration expressions to other time expressions, which Chomsky's approach does not do.

Notice that the selectional features that were developed in Chapter 2 account for the collocations between the N's in the Duration phrases and the N's in the Locative phrases in expressions (20) - (23). However, these features do allow the following inappropriate expressions to be generated:

(25) *for two mornings on the third of June
(26) *for five winters in 1960
(27) *for three Tuesdays last week
(28) *for six Decembers in 1965

To prevent the generation of (25) - (28), we need Rule C.3:
Rule C.3

| [+ Part of day] | [-_cop [+ Day]] |
| [+ Day, - Common] | [-_cop [+ Week]] |
| [+ Season] | [-_cop [+ Year]] |
| [+ Month, - Common] | [-_cop [+ Time]] |

The rules stated so far also prevent the generation of (29) - (30):^5

(29) *for two years on Tuesday
(30) *for one month at six o'clock

The following expressions are examples of another class of Duration Time expressions:

(31) all of the third day
(32) for part of the morning
(33) for most of June

If we call all of, part of, and most of Det₃, then the structure of (32) - (33) can be described as follows:

Prep₄ + Det₃ + Det₁ + [+ N, + Time]

To generate this, several changes must be made in the rules. First we modify Rule B.1 to C.4:
Rule C.4

\[
\text{Det} \longrightarrow \begin{cases} 
\{\text{Det}_1\} / \\
\{\text{ Det}_2\} / \\
\text{Det}_1 \\
\text{Det}_3 + \text{ Det}_1 / \text{Prep}_4 \quad \text{N}
\end{cases}
\]

Next, we add a Det\textsubscript{3} rewrite rule:

Rule C.5

\[
\text{Det}_3 \longrightarrow \begin{cases} 
\text{all of} \\
\text{part of} \\
\text{most of}
\end{cases}
\]

Then, since for is usually deleted before all of, and sometimes before the other Det\textsubscript{3}'s, we add the following optional deletion rule:

Rule C.6

SD: Prep\textsubscript{4} + Det\textsubscript{3} + Det\textsubscript{1} + N

1 2 3 4

SC: 1 -- 2 -- 3 -- 4 ---> 2 -- 3 -- 4

The following two expressions illustrate a special problem:

(34) all of the third hour
Expression (35) can be derived from (36) if Rule A.2.1 for [+ Year] is modified to C.7.6

(36) all of the 1950th year

Rule C.7

SD: the + ordinal + [+ Year]

1 2 3

SC: 1 -- 2 -- 3 --> cardinal

Condition: ordinal and cardinal have the same "value."

Rule A.2.1 can now be restated as C.8.

Rule C.8

SD: Prep + the + ordinal + [+ Hour]

1 2 3 4

SC: 1 -- 2 -- 3 -- 4 --> 1 -- cardinal

Condition: ordinal and cardinal have the same "value."

Rule C.8 will not apply to (34).

If Det₁ is replaced by Det₂, we have the following Duration Time expressions:

(37) all of one morning
(38) all of next week
(39) all of last year
To generate (37) - (39), and expressions like them, the rules must be modified further. First, Rule C.4 must be changed to C.4'.

**Rule C.4'**

\[
\begin{align*}
\text{Det} \rightarrow & \quad \begin{cases}
\{\text{Det}_1\} / \quad (\text{[+ General]}) \\
\{\text{Det}_2\} / \quad (\text{[+ Day, + Common]}) \\
\text{Det} / \quad (\text{[+ Week]}) \\
\text{Det} / \quad (\text{[+ Month, + Common]}) \\
\text{Det} / \quad (\text{[+ Year]})
\end{cases} \\
\text{Det}_1 \\
\text{Det}_2 \\
\text{Det}_3 + \{\text{Det}_1\} / \quad \text{Prep}_4 \quad \text{N}
\end{align*}
\]

Next, Rule C.6 must be changed to C.6'.

**Rule C.6'**

SD: \text{Prep}_4 + \text{Det}_3 + \{\text{Det}_1\} + \text{N} \\
1 \quad 2 \quad 3 \quad 4 \\
SC: 1 \quad 2 \quad 3 \quad 4 \rightarrow 2 \quad 3 \quad 4

In addition to the time expressions we have considered so far, there is another class of Duration expressions that is represented by the following:

(40) *from Sunday to Monday*

(41) *from this year to next year*

(42) *from before June to after December*
The structure of \((3^4) - (3^6)\) can be described as:

\[ \text{Prep + TP + Prep + TP} \]

Since these expressions are themselves TP's, we must revise our TP expansion rules. If we call these \textit{from ... to ...}\) constructions TP\(_2\), then we can add the following rule:

\textbf{Rule C.9}\)

\[ TP \rightarrow \{ TP_1, TP_2 \} \]

C.9 will now be the initial rule in our grammar of TP.

Next, we add Rule C.10 to expand TP\(_2\):

\textbf{Rule C.10}\)

\[ TP_2 \rightarrow \text{Prep + TP}_1 + \text{Prep + TP}_1 \]

Since TP\(_1\) is the TP as we have considered it prior to Rule C.9, we must modify Rule A.1.1 to C.11:

\textbf{Rule C.11}\)

\[ TP_1 \rightarrow (\text{NP}) \text{Prep + NP} \]

Of course, all the previously stated rules in which TP appears will also have to be modified by changing TP to TP\(_1\).

The Prep rewrite rules must now be changed. First, to separate the Preps in TP\(_1\) and TP\(_2\), we state the following rule:
Rule C.12

\[
\text{Prep} \rightarrow \begin{cases} 
\text{Prep}_a / (\text{NP} \quad \text{NP} \ T_P) \\
\text{Prep}_b 
\end{cases}
\]

Prep\textsubscript{a} corresponds to Prep as we have considered it so far, and so we must change Prep to Prep\textsubscript{a} in all the rules prior to C.9. Finally we must add a rule to rewrite Prep\textsubscript{b}:

Rule C.13

\[
\text{Prep}_b \rightarrow \begin{cases} 
\text{to} / \text{NP} \quad \text{Prep}_a \\
\text{from} 
\end{cases}
\]

Our rules will now generate expression (42) and the following:

(43) from on Sunday to on Monday
(44) from in this year to in next year

To prevent (43) and (44) from appearing in surface structure, we need the following obligatory deletion transformation:

Rule C.14

\[
\text{SD: from} + \text{Prep}_1 + \text{NP} + \text{to} + \text{Prep}_1 + \text{NP} \\
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \\
\text{SC:} 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \rightarrow 1 \quad 3 \quad 4 \quad 6
\]

Also, our rules will generate the following unacceptable Duration Time expressions:

(45) *from for four hours to six o'clock
(46) *from by two o'clock to six o'clock
The generation of (45) and (46) can be blocked by assigning the feature \([-\text{Prep}_b, ____]\) to for and by.

A class of Duration Time expressions similar to (40) - (42) is represented by (47):

\[(47) \text{ from Monday to Tuesday in last week}\]

This expression is derived from (48), which is generated by

\[(48) \text{ from Monday in last week to Tuesday in last week}\]

the rules we have stated. The deep structure of (48) is represented in Figures 4, 5, and 6, where 5 is inserted in 4 in the position of TP\(_1\) immediately after from and 6 is inserted in the position of TP\(_1\) immediately after to:

```
Figure 4
```
Figure 5
To allow (47) to be derived from (48), we need the following optional rule:

**Rule C.15**

SD: $\text{Prep}_b + \text{Prep}_a + \text{NP} + \text{TP}_1 + \text{Prep}_b + \text{Prep}_a + \text{NP} + \text{TP}_1$

```
1 2 3 4 5 6
```

SC: $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 6$

Condition: $3=6$

Figure 6
Note that this transformation will be blocked if Rule B.5 has been applied.

There is another class of Duration Time expressions that is quite similar to expressions (40) - (42):

(49) from Sunday until Monday
(50) from this year until next year
(51) from before June until after December

To generate these, we simply modify Rule C.13:

Rule C.13'

\[
\text{Prep}_b \longrightarrow \begin{cases} \text{to} & / \text{NP} \quad \text{Prep}_a \\ \text{until} & \\ \text{from} & \end{cases}
\]

Let us now consider the following Duration Time expressions:

(52) from then until June
(53) from now until June
(54) until June
(55) from June until then
(56) from June until now
(57) since June

Although expressions (54) and (57) may appear at first to be a different class of Duration Time expressions, we find on closer examination that (54) can be derived from (52) or (53)
and that (57) can be derived from (55) or (56). To derive (54) from (52) or (53), we need the following optional transformation:

**Rule C.16**

\[
\text{SD: } \text{from} + \text{at} + \left\{ \begin{array}{c} \text{this} \\ \text{that} \end{array} \right\} + \text{time} + \left\{ \begin{array}{c} \text{to} \\ \text{until} \end{array} \right\} + \text{TP}_1
\]

\[
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6
\]

\[
\text{SC: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow \text{until} \rightarrow 6
\]

To derive (57) from (55) or (56) we need a similar optional transformation:

**Rule C.17**

\[
\text{SD: } \text{from} + \text{TP}_1 + \left\{ \begin{array}{c} \text{to} \\ \text{until} \end{array} \right\} + \text{at} + \left\{ \begin{array}{c} \text{this} \\ \text{that} \end{array} \right\} + \text{time}
\]

\[
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6
\]

\[
\text{SC: } 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow \text{since} \rightarrow 2
\]

We will now examine how the Duration Time expressions we have discussed collocate with expansions of the Auxiliary. Single phrase Duration Time expressions that have the structure \(\text{Prep}_4 + \text{Det}_1 + N\) collocate with the Auxiliary expansions given in Rule A.12. The embedded TP governs the collocation restrictions of Duration Time sequences in which the matrix TP is as above. When, however, the single phrase Duration expression has the structure \(\text{Prep}_4 + \text{Det}_3 + \left\{ \begin{array}{c} \text{Det}_1 \\ \text{Det}_2 \end{array} \right\} + N\), the collocation restrictions are the same as for the corresponding \(\text{Prep}_1 + \left\{ \begin{array}{c} \text{Det}_1 \\ \text{Det}_2 \end{array} \right\} + N\).
Locative expression.

The Auxiliary expansions that collocate with $TP_2$ Duration Time expressions are governed primarily by the $TP_1$'s. If both $TP_1$'s are Static Time expressions, the $TP_2$ collocations with Auxiliary are the same as those of the $TP_1$'s. If the $Det_2$'s in both $TP_1$'s are the same, the $TP_2$ collocates with the same Auxiliary expansions as the corresponding Dynamic expression. If the $Det_2$ in the first $TP_1$ is last, and the $Det_2$ in the second $TP_1$ is next, then $TP_2$ collocates with the same expansions as the second $TP_1$. $TP_2$'s that result when C.16 or C.17 is applied, however, have special collocation restrictions with Auxiliary expansions.

The Auxiliary expansions that collocate with until $+ Det_1 + N$ are given in Rule C.18:

**Rule C.18**

$$\begin{align*}
\text{Aux} \rightarrow & \left\{ \begin{array}{c}
\{ \text{will} \} \ (\{ \text{have} + \text{en} \}) \\
\{ \text{shall} \} \ (\{ \text{be} + \text{ing} \}) \\
\{ \text{can} \} \\
\{ \text{may} \} \ (\{ \text{have} + \text{en} \}) \ (\{ \text{be} + \text{ing} \}) \\
\{ \text{must} \} \\
\{ \text{past (M)} \} \ (\{ \text{have} + \text{en} \}) \ (\{ \text{be} + \text{ing} \})
\end{array} \right. \\
\end{align*}$$

Rule C.19 gives the expansions that collocate with until + this $+ N$:
Rule C.19

\[
\text{Aux} \rightarrow \begin{cases} 
\text{will} \\
\text{shall} \\
\text{can} \\
\text{may} \\
\text{must} \\
past \ (M) \ (\text{have} + \text{en}) \ (\text{be} + \text{ing}) 
\end{cases}
\]

When TP\_2 is until + that + N, the appropriate expansions are given in Rule C.20:

Rule C.20

\[
\text{Aux} \rightarrow \begin{cases} 
\text{will} \\
\text{shall} \\
\text{can} \\
\text{may} \\
\text{must} \\
past \ (M) \ (\text{have} + \text{en}) \ (\text{be} + \text{ing}) 
\end{cases} \quad (\text{be} + \text{ing})
\]

Rules C.21 and C.22 give the Auxiliary expansions that collocate with until + next + N and until + last + N, respectively:
**Rule C.21**

\[
\text{must} \\
\text{can} \\
\text{may} \\
\text{will} \\
\text{shall}
\]

\[
\text{(have + en)}
\]

\[
\text{(be + ing)}
\]

**Rule C.22**

\[
\text{can} \\
\text{may} \\
\text{must}
\]

\[
\text{have + en (be + ing)}
\]

**Rule C.23**

\[
\text{present (M) have + en (be + ing)}
\]

\[
\text{past} \\
\text{∅}
\]

\[
\text{have + en (be + ing)}
\]

When TP\(_2\) is \text{since} + \left\{ \begin{array}{c} \text{Det}_1 \\ \text{this} \end{array} \right\} + N, \text{ the appropriate}

Auxiliary expansions are given in C.23:
When TP₂ is \text{since} + \{ \text{that}, \text{last} \} + N, the expansions are given in C.24.8

\begin{equation}
\text{Rule C.24}
\end{equation}

\[
\begin{aligned}
\text{Aux} \rightarrow & \begin{cases} 
\text{present} & (M) \ 	ext{have} + \text{en} \ (\text{be} + \text{ing}) \\ 
\text{can} & \\
\text{past} & M \ 	ext{have} + \text{en} \ (\text{be} + \text{ing}) \\
& \emptyset \ 	ext{be} + \text{ing} 
\end{cases}
\end{aligned}
\]

In summary, then, there are fairly substantial differences between Locative and Duration Time expressions. As was seen in Chapters 2 and 3, Locative Time expressions have the basic deep structure Prep + NP. Two types of Duration Time expressions also have this structure, but their Prep is different from those in Locative phrases. Also, whereas in Locative expressions Det is Det₁ or Det₂, in Duration expressions Det is either cardinal (a particular Det₁), or Det₃ + Det₁ or Det₃ + Det₂. Det₃ is, thus, peculiar to Duration expressions. Another type of Duration expression, TP₂, is a combination of a pair of Preps, each peculiar to Duration expressions, and a pair of Locative TP's, thus: Prep + TP₁ + Prep + TP₄.

In spite of these differences, however, Duration Time expressions are more similar to Locative Time expressions than Chomsky's approach suggests. ⁹ Both kinds of time expressions are dominated by the same node, TP, in the phrase structure of sentences. Furthermore, Duration and
Locative expressions can combine (with essentially the same collocation restrictions holding between the N's of the TP's and by means of essentially the same embedding transformations) to form Duration Time expressions that are surface structure sequences of phrases.

Duration Time expressions that are TP^1's can collocate with all expansions of the Auxiliary if they are single phrases with the structure Prep_N4 + cardinal + N. If they are surface structure sequences in which the matrix sentence TP has the above structure, the collocations are determined by the TP in the embedded S. The collocation restrictions of the corresponding Locative expressions determine the restrictions on the other type of TP^1. Similarly, the TP^1's determine the collocations of TP^2's. If, however, Rule C.16 or C.17 has been applied to the TP^2, the restrictions are given in Rules C.18 to C.23.
SUMMARY OF RULES IN CHAPTER IV

C.2 (105)
\[ TP \longrightarrow \{ TP_1 \} \]

C.10 (105)
\[ TP_2 \longrightarrow \text{Prep} + TP_1 + \text{Prep} + TP_1 \]

C.11 (105)
\[ TP_1 \longrightarrow \text{(NP) Prep} + \text{NP} \]

C.12 (106)
\[ \text{Prep} \longrightarrow \{ \text{Prep}_a / [(\text{NP}) \ldots \text{NP}]TP_1 \} \]

C.13 (106, 110)
\[ \text{Prep}_b \longrightarrow \{ \{ \text{to} \} / \text{NP} \ldots \text{Prep}_a \} \]

C.1 (96)
\[ \text{Prep}_a \longrightarrow \{ \text{Prep}_2 / \text{NP} \ldots \}
\]

C.2 (96)
\[ \text{Prep}_4 \longrightarrow \text{for} \]
\[ (102, 104) \]

\[ \text{Det} \rightarrow \begin{cases} \{\text{Det}_1\} / \text{Det}_2 \\ \text{Det}_1 \\ \text{Det}_3 + \{\text{Det}_1\} / \text{Prep}_4 \rightarrow \text{N} \end{cases} \]

\[ (+ \text{General}) \]
\[ (+ \text{Day, + Common}) \]
\[ (+ \text{Week}) \]
\[ (+ \text{Month, + Common}) \]
\[ (+ \text{Year}) \]

\[ (102) \]

\[ \text{Det}_3 \rightarrow \begin{cases} \text{all of} \\ \text{part of} \\ \text{most of} \end{cases} \]

**Transformations**

\[ (101) \]

\[ \begin{align*}
(+ \text{Part of day}) & \rightarrow \begin{cases} \text{cop} [+ \text{Day}] \\ \text{cop} [+ \text{Week}] \\ \text{cop} [+ \text{Year}] \\ \text{cop} [+ \text{Time}] \end{cases} \\
(+ \text{Day, - Common}) & \rightarrow \begin{cases} \text{cop} [+ \text{Day}] \\ \text{cop} [+ \text{Week}] \\ \text{cop} [+ \text{Year}] \\ \text{cop} [+ \text{Time}] \end{cases} \\
(+ \text{Season}) & \rightarrow \begin{cases} \text{cop} [+ \text{Day}] \\ \text{cop} [+ \text{Week}] \\ \text{cop} [+ \text{Year}] \\ \text{cop} [+ \text{Time}] \end{cases} \\
(+ \text{Month, - Common}) & \rightarrow \begin{cases} \text{cop} [+ \text{Day}] \\ \text{cop} [+ \text{Week}] \\ \text{cop} [+ \text{Year}] \\ \text{cop} [+ \text{Time}] \end{cases} \\
\end{align*} \]

\[ (102, 104) \]

SD: \[ \text{Prep}_4 + \text{Det}_3 + \{\text{Det}_1\} + \text{N} \]

\[ 1 \quad 2 \quad 3 \quad 4 \]

SC: \[ 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 2 \rightarrow 3 \rightarrow 4 \]
C.2 (103)

SD: the + ordinal + [+ Year]

1  2  3

SC: 1 -- 2 -- 3 --> cardinal

Condition: ordinal and cardinal have the same "value."

C.8 (103)

SD: Prep + the + ordinal + [+ Hour]

1  2  3  4

SC: 1 -- 2 -- 3 -- 4 --> 1 -- cardinal

Condition: ordinal and cardinal have the same "value."

C.14 (106)

SD: from + Prep + NP + to + Prep + NP

1  2  3  4  5  6

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --> 1 -- 3 -- 4 -- 6

C.15 (109)

SD: Prep + Prep + NP + Prep + NP + Prep + NP + TP

1  2  3  4  5  6

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --> 1 -- 2 -- 4 -- 5 -- 6

Condition: 3 = 6
\[ C.16 \ (111) \]

\[ \text{SD: from + at + \{this\} + time + \{to until\} + TP_1} \]

\[ 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \]

\[ \text{SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 \quad \longrightarrow until \quad -- \quad 6} \]

\[ C.17 \ (111) \]

\[ \text{SD: from + TP_1 + \{to until\} + at + \{this that\} + time} \]

\[ 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \]

\[ \text{SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 \quad \longrightarrow since \quad -- \quad 2} \]
NOTES TO CHAPTER IV

1Note that there are at least two kinds of some, the Det\textsubscript{2} we considered in Chapter 3 and the some we are considering here.

2These modifiers are probably analogous to Det\textsubscript{3}. See the treatment of all of, part of, on pp. 101-104.

3See Introduction, p. 7, where Chomsky's rules are given.

4Figure 3 includes only the general structure given by the Aspects model. Details such as syntactic features have been omitted for simplicity.

5(29) might be interpreted as being derived from on every Tuesday in Det two years and (30) as derived from at six o'clock every day in Det month. If this were the case, then (29) and (30) would still be generated from a structure other than a Duration Time phrase and an embedded Locative phrase.

6This revision of Rule A.2.1 parallels the revision of Rule A.2.2 made on p. 52.

7It might be argued that the structure is for + Prep + TP + Prep + TP. We feel, however, that since this approach raises essentially the same problems as the one we have chosen, and in addition presents problems for which there are no solutions in the grammar as a whole, our approach is preferable.

8The since + next + N construction does not occur.

9See pp. 99-100.
CHAPTER V
CONCLUSION

In the Introduction, the construction of a fragment of a transformational generative grammar that would generate certain English time expressions was given as the aim of this study. This fragment, the main result of this study, is given in the Appendix.

Other results relate to TG theory. Here we review the major problems raised in the Introduction and our solutions to them. We also indicate some basic problems in the TG model as a whole that remain unsolved and suggest some areas in which the need for further scholarship is indicated.

One major problem that was raised in the Introduction was whether the time constituent (TP) should be dominated in phrase structure by S, by VP, or by Predicate. Following Chomsky's approach in *Aspects of the Theory of Syntax*, we chose to place TP under the domination of Predicate, but we noted that this placement is controversial. Lees, Katz and Postal, and Thomas place Time under the domination of MV, where MV is dominated by VP. The major difference between these two approaches is that Chomsky's approach allows Auxiliary and Time to share a dominating node, but the other does not. Our demonstration of the collocation restrictions that hold between Auxiliary
expansions and time expressions suggests that our solution to the domination problem is more valid than the alternative. It may even be the case that the most satisfactory procedure is to place both Auxiliary and TP under the domination of a common node, call it X, that is in turn dominated by Predicate-Phrase, thus:

![Diagram](image)

**Figure 1**

The third major alternative, having Time dominated by S, is favoured by Weinreich, Lyons, and Fillmore. In footnotes, however, Weinreich admits that Chomsky's approach may be more acceptable, and Chomsky admits that Time may be better considered as dominated by S. Fillmore's placement of Aux under the domination of $S^2$ suggests that it may even be best to place our X node under S, thus:
Another problem raised in this study was how the time constituent should be expanded. We assumed that surface structure single phrase time expressions are generated by expanding TP as Prep + NP. This procedure is fairly standard. Jacobs and Rosenbaum, and Fillmore, however, have proposed alternative solutions. The former suggest that prepositions "originate as features in deep structures -- in particular, as features of noun segments." At the present state of TG, however, this appears to be a more complicated approach than ours, for it implies that all the prepositions with which a noun can collocate must be listed in that noun's complex symbol. Thus, Monday, for example, would have to have at least the features [+ on, + before, + after, + by], in addition to the features which we have assigned to it. Furthermore, their solution does not appear to allow any more insight into time expressions than does ours. Fillmore also claims that "prepositional phrases" are in fact NP's and that NP's are expanded as follows:
This may be found to be the best approach, but it does not at present have any serious implications for our solution.

Time expressions that are either single words or sequences of phrases in surface structure pose more serious problems than do those that are single phrases in surface structure. Chomsky, in the Third Texas Conference model, Lees, and Thomas introduce single word time expressions directly as rewrites of Time. Lyons proposes the following rule for expanding Time:

\[
\text{Time Adverb} \rightarrow \begin{cases} \text{Preposition + Time Noun} \\ \text{Temporal Conjunction + } \Sigma \end{cases}
\]

This rule, however, is optional, and when it is bypassed, "Time Adverb will appear in the terminal string and be replaced in sentences by yesterday, etc." Although this appears at first to be a very neat solution, it creates some serious problems. First, it suggests that there is a difference between Time Noun and Time Adverb. This seems to be an unnecessary complication, for yesterday, which would be a Time Adverb, and Tuesday, which would be a Time Noun, behave in essentially the same way. Second, the transformations would be more complicated because both the single word and phrasal alternatives would have to be stated in the structural descriptions. Finally, since prepositions in English do bear some resemblance to case endings in other
languages, it is probably a mistake to overemphasize the surface structure absence of prepositions in these single word time expressions.

In this study we chose to treat time expressions that are single words in surface structure as transformationally derived from deep structure Prep + NP constructions.\textsuperscript{10} It is felt that this choice both simplifies the grammar and accounts for the behavior of the expressions more revealingly.\textsuperscript{11}

The other major expansion problem is that presented by surface structure sequences of time phrases. We decided to reject the following two approaches:

\begin{align*}
(1) \quad TP & \rightarrow \text{Prep} + \text{NP} (TP) \\
(2) \quad TP & \rightarrow TP_1 + TP_2 + TP_3
\end{align*}

Although both of these would have generated surface structure sequences, neither of them shows deep structure relationships between the time phrases. Also, there is no clear way in which the ordering restrictions for these phrases could be shown. Thus, they are both unrevealing and cumbersome. In this study we chose to derive surface structure sequences of time phrases from successive embeddings of sentences with the structure WH + NP + Aux + cop + TP into the NP of the matrix TP. To derive the surface structure from this deep structure, we applied the relative clause transformation, a transformation needed in the TG model as a whole. Our approach
has several advantages. First, because a transformation that is needed elsewhere in the grammar can be used for the derivation, this is a simpler approach. Second, essentially the same approach can be used to generate both Locative and Duration Time sequences. Third, it reveals the deep structure relationships between the phrases. Finally, together with the syntactic features approach to subcategorization, it allows us to state the surface structure ordering restrictions as deep structure relationships.

A further problem raised in this study was the question of subcategorizing the category Noun so that place expressions could be distinguished from time expressions. The methodology adopted here was the syntactic features methodology outlined by Chomsky in Aspects of the Theory of Syntax. We defined time phrases as those Prep + NP constructions in which the N of the NP has the syntactic feature [+ Time]. In doing this, we had to extend Chomsky's list of features for nouns, but this is an advantage rather than a disadvantage, for it allows us to generate time expressions, which the Aspects model could not. Then, we subcategorized time nouns further by assigning to each at least one of the following features: [+ Minute], [+ Hour], [+ Day], [+ Week], [+ Festival], [+ Month], [+ Season], [+ Year], [+ General]. This was an innovation, but it was found that it was necessary to allow us to state clearly some preposition and determiner choices and to distinguish
the structural descriptions of several transformations. Two important points must be made clear here. First, since these features are needed for certain syntactic rules to be stated, it has been assumed that these are syntactic features. It is recognized that the labels of these features suggest that there is probably a close relationship between the semantic meaning of the lexical items having these features and the features themselves. We are not, however, in a position at the present time to draw any conclusions about the relationship between semantic and syntactic features. As Chomsky said in *Syntactic Structures*:

> There is no aspect of linguistic study more subject to confusion and more in need of clear and careful formulation than that which deals with the points of connections between syntax and semantics.12

Secondly, the ordering restrictions on the time phrases were stated in terms of these features. That is, selectional features stated in terms of the above inherent features were used to designate the embedding restrictions between the N of the matrix TP and the N of the constituent sentence TP. In addition, some features were used to account for the idiosyncratic behavior of some time nouns. Since time expressions in surface structure are particularly subject to irregularities, this was found to be very useful.

At this point we must stress again the importance of optimality in subcategorization and the adaptability of
the syntactic features approach to it. We claimed in the Introduction that a system of subsets of the lexicon is optimal if it provides sufficient distinctions in the lexicon for the rules of the grammar to operate. We have, in this study, introduced just those features that were needed for our rules. If we had been concerned with generating only single phrase time expressions, we would not have needed the selectional features and we would have also been able to omit some of the inherent features. Also, if we had wanted to limit ourselves to a very general grammar of time expressions, we may have needed to introduce only the feature [+ Time]. Further, if a finer grammar than the one in this study had been the aim, an even more particularized feature scheme would probably have been needed.

Basic to this study is the subcategorization of time expressions. In other words, we claim that every Prep + NP construction in which the N of the NP has the feature [+ Time] is a time expression, but these time expressions are of various kinds. The initial division we made was between Locative and Duration Time expressions. Verbs can be subcategorized on the basis of whether or not they collocate with Duration expressions. Locative Time expressions, we found, have the structure Prep + Det + N (S'), where Prep is Prep₁, Prep₂, or Prep₃, and Det is Det₁ or Det₂. The subclass Locative Time can be further subdivided into what we have called Static Time and Dynamic Time, on the basis of
the criteria needed to decide their collocation restrictions with Auxiliary expansions. Static Time expressions are those Locative expressions whose collocation restrictions with Auxiliary expansions can only be determined with reference to the situational context. Dynamic Time expressions, on the other hand, are those Locative expressions whose collocation restrictions with Auxiliary expansions are linguistically determinable. Static Time expressions are distinct from Dynamic Time expressions in that the Det in the former is Det\(_1\) and in the latter is Det\(_2\). Furthermore, we find that Det\(_1\) is what might be called a "definite" determiner. That is, it is either the, \(\emptyset\), cardinal, or the + ordinal or the + S'. The choice of a particular alternative here is determined by the features of the noun. Det\(_2\), on the other hand, is either indefinite or relational.

Duration expressions are primarily distinguished from Locative expressions in that Prep is Prep\(_4\) and Det is cardinal. There is also a class of Duration expressions that has the structure Prep\(_b\) + TP\(_1\) + Prep\(_b\) + TP\(_1\) in which Prep\(_b\) is from and to and TP\(_1\) is a Locative expression. Duration expressions do not bear any particular relationship in themselves to Auxiliary expansions.

What is most significant about our treatment of Duration expressions is that they are very similar to Locative expressions. They have the same basic Prep + NP structure as Locative expressions, and differ only in Prep and Det. Also,
they are dominated by the same node, Time, in deep structure. As was discussed earlier, this is a fairly important difference from Chomsky's approach.

We found that in surface structure all three types of time expressions can cooccur in sequences, as in:

**for three hours on June 6 next year**

Our solution of the deep structure of this type of expression supports our intuitions that this expression is in fact a single unit. It is probably the case, although we have not examined it in this study, that other time expressions, such as frequency, behave in a similar way.

Another problem on which we have touched in this study, and which requires further exploration is the relationship between the Auxiliary and the time expressions. We have pointed out that the rule Aux → C (M) (have + en) (be + ing) is an oversimplification. Then we have tried to overcome this by pointing out what the expansion rule must be in some contexts. In stating these rules we have limited ourselves to the Auxiliary and TP in matrix sentences. That is, we have not considered what are traditionally known as conditional clauses. Also, our long series of rules is obviously too cumbersome for a working grammar. We have, furthermore, made no attempt to decide whether it is more economical or more accurate to state Auxiliary choices in terms of TP or
vice versa. The restrictions exist and they must be formulated properly. At the same time, we have not attempted to state the relationship between the Auxiliary in what are traditionally called adverbial clauses of time and the Auxiliary of the main clause.

If we examine the TP rules in the Appendix, we can divide them into two groups. First, we have a number of rules that are analogous to what are commonly called phrase-structure rules. These are somewhat eclectic in the sense that although the Aspects model is used for stating the syntactic features of nouns, the Aspects model has not been used consistently. There are two reasons for this. First, the Aspects model is not complete enough to be applied directly. In other words, it is more an illustration of how some problems can be dealt with than a working model. Second, since the focus of this study is on time expressions, it was felt unnecessary to attempt to achieve completeness. As a result, only such matters as had to be treated have been considered. This is particularly true of the rules that rewrite various Det and Prep subcategories as lexical items. It is not at all clear that our procedure is legitimate. Obviously, too, these rules would be different in the whole grammar. The rules we have stated are those that are necessary to generate those time expressions we have considered.
The other rules are what are commonly called the transformations. Within these there are two major kinds. First, there are those which are necessary to change the deep structure to surface structure time expressions. These might be called obligatory. Second, there are those which produce stylistic variations. Some of these second kind would apply late in the derivation and would be optional. We find also that there are both those transformations that are needed elsewhere in the grammar and those that apply only to time expressions. Again, as with syntactic features, an optimal system must be aimed at. That is, it is ideal to state those transformations that will generate the maximum number of expressions with the minimum number of rules.

This investigation has reinforced, then, the need for solutions to several theoretical and methodological problems in TG. In addition, there are a number of particular problems related to time expressions that require further study. First, and most obvious, is the need to extend this particular investigation to what are traditionally called adverbial clauses of time. Second, the collocation restrictions between Auxiliary expansions and the various types of time expressions must be worked out in greater detail. Third, the investigation of time expressions must be extended to such subclasses as Frequency. Finally, the relationship between time expressions and other adverbial expressions must be worked out.
NOTES TO CHAPTER V

1 Note that VP as used in these models does not correspond to Chomsky's VP in *Aspects*. Their MV is, however, like Chomsky's VP, and in this sense we can say that in their models Time is dominated by VP. See pp. 6-7.


4 Also, their distinction between "prepositional phrases" and those NP's in which the prepositions are features of nouns is confused.


8 Lyons, p. 224.

9 Compare yesterday morning and yesterday's game with Tuesday morning and Tuesday's game. Also, in the following sentences:

(1) He went to school yesterday.
(2) He went to school Tuesday.
(3) He went to school on Tuesday.

Yesterday in (1) and Tuesday in (2) would be Time Adverbs and Tuesday in (3) would be a Time Noun. Furthermore, when yesterday occurs with Prep2 or Prep3, it, too, would have to be classed as a Time Noun.

10 As was pointed out in Chapter 3, it is not entirely clear how these transformations can best be incorporated into the model.
Witness the collocation restrictions with Auxiliary expansions, for example.

It is also worth considering that the surface structure single word time expressions vary from language to language. Thus, for example, the day before yesterday is aizvakar in Latvian, Vorgestern in German, and pozevčera in Russian; the day after tomorrow is parīt in Latvian, Übermorgen in German, and poslezavtra in Russian. Although the present study is confined to English, the possibility of universal application of an approach may be worthwhile when alternatives are considered.


It will probably be found that this can be done best by means of syntactic features. Since the methodology needed for doing this does not, to the best of my knowledge, exist, and since this problem is peripheral to the study, it will not be discussed further here.
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APPENDIX

SUMMARY OF TP RULES

D.1 (C.9)

\[ TP \rightarrow \{ TP_1 \} \]

D.2 (C.10)

\[ TP_2 \rightarrow \text{Prep + TP}_1 + \text{Prep + TP}_1 \]

D.3 (C.11)

\[ TP_1 \rightarrow (\text{NP}) \text{Prep + NP} \]

D.4 (A.1.2)

\[ \text{NP} \rightarrow \text{Det + N (S')} \]

D.5 (A.1.3)

\[ N \rightarrow [+ N, + Time] \]

D.6 (A.1.4)

\[ [+ \text{General}] \]
\[ [+ \text{Hour}] \]
\[ [+ \text{Part of day}] \]
\[ [+ \text{Day}] \]
\[ [+ \text{Time}] \]
\[ [+ \text{Week}] \]
\[ [+ \text{Festival}] \]
\[ [+ \text{Month}] \]
\[ [+ \text{Season}] \]
\[ [+ \text{Year}] \]
D.7 (C.12)

\[
\text{Prep} \longrightarrow \begin{cases} 
\text{Prep_a} / \left[ (\text{NP}) \quad \text{NP} \right]_\text{TP1} \\ 
\text{Prep_b}
\end{cases}
\]

D.8 (C.13)

\[
\text{Prep_b} \longrightarrow \begin{cases} 
\left\{ \text{to} \right\} / \text{NP} \quad \text{Prep_a} \\
\text{until} \\
\text{from}
\end{cases}
\]

D.9 (C.1)

\[
\text{Prep_a} \longrightarrow \begin{cases} 
\text{Prep_2} / \text{NP} \quad \text{Prep_1} \\
\text{Prep_2} \\
\text{Prep_3} \\
\text{Prep_4}
\end{cases}
\]

D.10 (A.1.6b)

\[
\text{Prep_1} \longrightarrow \begin{cases} 
\text{at} / \quad \ldots \left\{ \left[ \text{+ General} \right] \right\} \\
\text{on} / \quad \ldots \left[ \text{+ Hour} \right] \\
\text{in} \\
\left[ \text{+ Festival} \right] \\
\left[ \text{+ Day} \right]
\end{cases}
\]

D.11 (A.1.6c)

\[
\text{Prep_2} \longrightarrow \begin{cases} 
\text{before} \\
\text{after}
\end{cases}
\]

D.12 (A.1.6d)

\[
\text{Prep_3} \longrightarrow \text{by}
\]
\( \text{D.13 (C.2)} \)

\( \text{Prep}_4 \rightarrow \text{for} \)

\( \text{D.14 (C.4)} \)

\[
\begin{align*}
\text{Det} \rightarrow & \quad \begin{cases}
\{\text{Det}_1\} / \quad \begin{cases}
\{\text{Det}_1\} / \quad \begin{cases}
[+ \text{General}] & \text{[+ Day, + Common]} \\
[+ \text{Day}, + \text{Common}] & \text{[+ Week]} \\
[+ \text{Month, + Common}] & \text{[+ Year]}
\end{cases}
\end{cases} \\
\{\text{Det}_2\} / & \quad \text{[+ General]}
\end{cases}
\end{align*}
\]

\( \text{D.15 (A.1.5)} \)

\[
\begin{align*}
\text{Det}_1 \rightarrow & \quad \begin{cases}
\text{the +} & \text{[+ ordinal]}
\end{cases} \\
\emptyset / & \quad \text{[+ Common]}
\end{cases}
\]

\[
\begin{align*}
\text{Det}_1 \rightarrow & \quad \begin{cases}
\text{the} / & \text{[+ Part of day]}
\end{cases} \\
\emptyset / & \text{[+ Season]}
\end{cases}
\]

\[
\begin{align*}
\text{cardinal} / & \quad \begin{cases}
\quad \quad \{\text{N + Prep}_2\} \\
\quad \quad \{\text{Prep}_4 \quad \text{N}\}
\end{cases}
\end{align*}
\]

\( \text{D.16 (B.2)} \)

\[
\begin{align*}
\text{Det}_2 \rightarrow & \quad \begin{cases}
\{\text{one}\} / \quad \text{Prep}_1 \quad \text{N}
\end{cases} \\
\{\text{some}\} / & \quad \text{Prep}_1 \quad \text{N}
\end{cases}
\]

\[
\begin{align*}
\{\text{this}\} / & \quad \text{Prep}_1 \quad \text{N}
\end{cases}
\]

\[
\begin{align*}
\{\text{that}\} / & \quad \text{Prep}_1 \quad \text{N}
\end{cases}
\]

\[
\begin{align*}
\{\text{next}\} / & \quad \text{Prep}_1 \quad \text{N}
\end{cases}
\]

\[
\begin{align*}
\{\text{last}\} / & \quad \text{Prep}_1 \quad \text{N}
\end{cases}
\]

\( D.17 \) (C.5)

\[
\text{Det}_3 \rightarrow \begin{cases} \text{all of} \\ \text{part of} \\ \text{most of} \end{cases}
\]

Transformations

\( D.18 \) (C.15)

SD: \( \text{Prep}_b + \text{Prep}_a + \text{NP} + \text{TP}_1 + \text{Prep}_b + \text{Prep}_a + \text{NP} + \text{TP}_1 \)

\[
1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6
\]

SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 6 \)

Condition: \( 3 = 6 \)

\( D.19 \) (C.16)

SD: \( \text{Prep}_b + \text{at} + \begin{cases} \text{this} \\ \text{that} \end{cases} + \text{time} + \text{Prep}_b + \text{TP}_1 \)

\[
1 \quad 2 \quad 3
\]

SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow \text{until} \rightarrow 3 \)

\( D.20 \) (C.17)

SD: \( \text{Prep}_b + \text{TP}_1 + \text{Prep}_b + \text{at} + \begin{cases} \text{this} \\ \text{that} \end{cases} + \text{time} \)

\[
1 \quad 2 \quad 3
\]

SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow \text{since} \rightarrow 2 \)
\[ \text{D.21 (C.14)} \]
SD: \( \text{Prep}_1 \text{ Prep}_2 \text{ NP} \)
\[
\begin{array}{ccc}
1 & 2 & 3
\end{array}
\]
SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 3 \)

\[ \text{D.22 (B.20)} \]
SD: \( \text{cardinal} \text{ + N + before + Det}_2 \text{ + N} \)
\[
\begin{array}{ccc}
1 & 2 & 3
\end{array}
\]
SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow \text{ago} \rightarrow 3 \)

\[ \text{D.23 (B.21)} \]
SD: \( \text{cardinal} \text{ + N + ago + this + N} \)
\[
\begin{array}{ccc}
1 & 2 & 3
\end{array}
\]
SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 1 \rightarrow 2 \)

\[ \text{D.24 (C.6)} \]
SD: \( \text{Prep}_4 \text{ + Det}_3 \text{ + } \begin{cases} \text{Det}_1 \\ \text{Det}_2 \end{cases} \text{ + N} \)
\[
\begin{array}{cccc}
1 & 2 & 3 & 4
\end{array}
\]
SC: \( 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 2 \rightarrow 3 \rightarrow 4 \)

\[ \text{D.25 (B.4)} \]
SD: \( \text{Prep}_1 \text{ + Det}_2 \text{ + N + Prep}_1 \text{ + Det}_2 \text{ + N} \)
\[
\begin{array}{cc}
1 & 2
\end{array}
\]
SC: \( 1 \rightarrow 2 \rightarrow 1 \)
Condition: \( \text{Det}_2 = \begin{cases} \text{one} \\ \text{some} \end{cases} \)
D.26 (B.3)

SD: \(\text{Prep}_1 + \text{Det}_2 + N\) 
\(1 \quad 2 \quad 3\)

SC: 1 -- 2 -- 3 \(\rightarrow\) 2 -- 3

D.27 (B.8)

SD: \(\text{one} + \{ [+ \text{Day}, - \text{Common}] \} \)

SC: 1 -- 2 \(\rightarrow\) on a -- 2

D.28 (C.3)

\[
\begin{array}{ccc}
[+ \text{Part of day}] & [\text{cop} [+ \text{Day}]] \\
[+ \text{Day, - Common}] & [\text{cop} [+ \text{Week}]] \\
[+ \text{Season}] & [\text{cop} [+ \text{Year}]] \\
[+ \text{Month, - Common}] & [\text{cop} [+ \text{Time}]] \\
\end{array}
\]

D.29 (C.7, C.8)

SD: \(\text{the} + \text{ordinal} + \{ [+ \text{Hour}] \} \)
\(1 \quad 2 \quad 3\)

SC: 1 -- 2 -- 3 \(\rightarrow\) cardinal

Condition: ordinal and cardinal have the same "value."
D.30 (A.2.2)

SD: the + ordinal + [+ Day, + Common]

|       | 1       | 2       |

SC: 1 -- 2 --&gt; 1

D.31 (B.15)

\[
\begin{array}{l|l|l}
\text{this} & \text{today} \\
\text{last} & \text{yesterday} \\
\text{next} & \text{tomorrow}
\end{array}
\]

D.32 (B.16)

\[
\begin{array}{l|l|l}
\text{this} & \text{now} \\
\text{that} & \text{then}
\end{array}
\]

D.33 (A.9)

SD: Prep + the + WH + N\textsubscript{1} + cop + TP + N\textsubscript{2}

|       | 1   | 2   | 3   | 4   | 5   | 6   |

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --&gt; 1 -- 2 -- 6 -- 5

Condition: N\textsubscript{1} = N\textsubscript{2}

D.34 (A.10)

SD: Prep + the + N\textsubscript{1} + one + N\textsubscript{2} + Prep + NP

|       | 1   | 2   | 3   |

SC: 1 -- 2 -- 3 --&gt; 1 -- 3

Condition: N\textsubscript{1} = N\textsubscript{2}
D. 35 (A. 11)

SD: $\text{Prep}_1 + \text{the} + N + \text{Prep}_2 + \text{NP}$

1  2

SC: 1 -- 2 --> 2

D. 36 (A. 4)

SD: \[
\begin{cases}
\text{Prep}_1 \\
\text{Prep}_2 \\
\text{Prep}_3
\end{cases}
\] + Det + [+ Time, - Hour] + \{on, in\} + NP

SC: 1 -- 2 -- 3 --> 1 -- of -- 3

D. 37 (A. 7, A. 7')

SD: $\text{Prep}_a + \emptyset + [\text{+ Month, - Common}] + \text{of} + \text{Det} + [\text{+ Year}]

\begin{array}{cccccc}
1 & 2 & 3 & 4 & 5 & 6 \\
\end{array}$

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --> 1 -- 5 -- 3

D. 38 (A. 5')

SD: \[
\begin{cases}
\text{Prep}_1 \\
\text{Prep}_2 \\
\text{Prep}_3
\end{cases}
\] + Det + [+ Day, + Common] + of + Det + \{[+ Month, - Common], [+ Season]\}

SC: 1 -- 2 -- 3 -- 4 -- 5 -- 6 --> 1 -- 2 -- 6 -- 3
\[D_{39} (B.7)\]

\[
\begin{aligned}
\text{SD: } & \left\{ \text{Prep}_2 \right\} + \text{the} + \left[ + \text{Part of day} \right] + \text{of} + \text{Det} + \left\{ \left[ + \text{Day}, \quad \text{Common} \right] \right. \\
& \left. + \text{Festival}, \quad \text{Common} \right\} \\
1 & 2 & 3 & 4 & 5 & 6 \\
\text{SC: } & 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 1 \rightarrow 5 \rightarrow 6 \rightarrow 3
\end{aligned}
\]

\[D_{40} (B.7)\]

\[
\begin{aligned}
\text{SD: } & \text{in} + \text{the} + \left[ + \text{Part of day} \right] + \text{of} + \text{Det} + \left\{ \left[ + \text{Day}, \quad \text{Common} \right] \right. \\
& \left. + \text{Festival}, \quad \text{Common} \right\} \\
1 & 2 & 3 & 4 & 5 & 6 \\
\text{SC: } & 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow (\text{on}) \rightarrow 5 \rightarrow 6 \rightarrow 3
\end{aligned}
\]

\[D_{41} (A.6)\]

\[
\begin{aligned}
\text{SD: } & \left\{ \text{Prep}_1 \right\} \\
& \left\{ \text{Prep}_2 \right\} + \text{the} + \text{ordinal} + \text{of} + \left[ + \text{Month}, \quad \text{Common} \right] \\
& \left\{ \text{Prep}_3 \right\} \\
1 & 2 & 3 & 4 \\
\text{SC: } & 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 1 \rightarrow 4 \rightarrow 2
\end{aligned}
\]

\[D_{42} (B.17)\]

\[
\begin{aligned}
\text{SD: } & \left\{ \text{Prep}_1 \right\} \\
& \left\{ \text{Prep}_2 \right\} + \text{the} + \left[ + \text{Part of day} \right] + \text{Prep}_1 + \left\{ \text{yesterday} \right\} \\
& \left\{ \text{tomorrow} \right\} \\
1 & 2 & 3 & 4 & 5 \\
\text{SC: } & 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 1 \rightarrow 5 \rightarrow 3
\end{aligned}
\]
D.43 (B:5)
SD: \[
\begin{cases}
\text{Prep}_1 \\
\text{Prep}_2 \\
\text{Prep}_3
\end{cases}
\] + \{ \emptyset \} + N + \text{Prep}_1 + \text{Det}_2 + N

SC: 1 -- 2 -- 3 -- 4 -- 5 \rightarrow 1 -- 4 -- 2

D.44 (B:6)
SD: \[
\begin{cases}
\text{Prep}_1 \\
\text{one} \\
\text{a}
\end{cases}
\] + N + \text{Prep}_1 + \{ \emptyset \} + N

SC: 1 -- 2 -- 3 -- 4 -- 5 \rightarrow 1 -- 5 -- 2